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by

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ABSTRACT

This study sought to investigate the impact of three different instructional methodologies on spelling performance at the Grade 5 level after eight weeks of intensive spelling instruction. The three methodologies varied from the least intensive traditional basal spelling approach involving the study-test approach, to the most intensive multi-channel multi-modality approach based on the Personke-Yee model for spelling instruction. A review of the literature on spelling instruction indicated that few studies had attempted to test the Personke-Yee theory. No such study has been attempted in Alberta.

In order to increase the criterion validity of the study, three separate dependent measures were used. These included the *Schonell Graded Word Spelling Test*, the *Stanford Achievement Spelling Test* and an *Informal Spelling Inventory*. The three treatment groups of twenty-three subjects each were randomly selected and controlled for chronological age and I. Q. Gain score analysis, one-way analysis of variance, and a 3 x 2 analysis of variance, with repeated measures on Factor B, were used to analyze the data. Although trends were in the predicted direction, only two of the four hypotheses were confirmed. These were Hypothesis 1, which predicted significant pre-test/post-test differences of Experimental Group 2 over the Control Group on the Schonell, and Hypothesis 2, which predicted a significant superiority of spelling performance of

Experimental Group 2 over Experimental Group 1 on the *Informal Inventory*.

The results of the investigation are discussed with reference to the efficiency of the multi-channel multi-modality method when compared with the traditional and the test-study-test approaches, the main hypothesis of the study. Implications for theory, research, and practice are discussed, with emphasis on practical suggestions for spelling instruction utilizing the multi-channel multi-modalty approach.

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I. THE PROBLEM

A. Background To The Problem

Spelling is an act which involves the correct formation of words from letters. This formation of words can be accomplished either orally or in written form. It has been well documented that spelling is not an easy task. Commenting on the complexity of the spelling act, Johnson and Myklebust (1967) observed that spelling required more simultaneous analysis, synthesis and integration, combined with auditory and visual perception abilities than did any other skill. While the attainment of spelling competency presents a difficult task, it is highly valued.

The ability to create written communication, with competent orthography, is a skill greatly sought by the citizens and businesses of the English-speaking nations of North America. These nations follow a pedagogical policy of compulsory public education for their children of approximately six to sixteen years of age. Even though not all citizens finish public school, the adults of these nations are expected to communicate, both verbally and in written form, in a manner that reflects an educated populace. However, for some persons, inferior orthographical skills in spelling the written language represent a life-time detriment.

Inferior orthographical skills have a multiple negative effect on the individual. Low achievement in spelling hampers the written presentation of ideas and also carries social stigma. Society connotatively associates inefficient spelling with low intelligence, poor scholastic achievement, and a careless attitude in the writer towards his written communication.

Because of the negative connotations, persons deficient in spelling may pay a heavy penalty in either the business or academic world. Within the business world, advancement through the levels of the business stratum may be delayed or blocked if the individual himself, or a business executive decides that a particular employee is incapable of clearly and correctly expressing his ideas in written form. Within the school system, poor spelling capabilities may create a negative spill-over effect that extends into all scholastic endeavors. In a commentary on this, Otto, McMenemy and Smith (1973) stated that a relationship does exist between problems causing poor spelling and lowered performance in the related skills of reading, listening and handwriting, as well as in oral and written expression.

While there is no consensus with regards to this negative spill-over effect, Rivers (1974) noted that spelling deficiency is on the increase at the elementary, secondary and college levels of education. Moreover, the initial instruction current in remedial spelling programs at the college level is based on the same words taught at the elementary level of schooling.

B. Theoretical Support

Because of the negative implications of deficient spelling skills, much time and effort has been and continues to be devoted to the search for effective instructional methodologies. Traditional spelling instruction proceeded on the premise that learning to spell involved mastering each new word by rote memory as a separate spelling task. However, this simplistic view of spelling has been replaced by the idea of spelling as a very complex act. The achievement of spelling accuracy through the necessary simultaneous use of the skills of auditory and visual discrimination, memory, sequentialization of letters and sounds, analysis, synthesis, and integration of the word components requires the use of a multi-channel multi-modality instructional approach for spelling. While there are other models for instruction in spelling--such as the Brothers and Holsclaw model (1969), the Simon and Simon model (1973), and the Nicholson and Schachter model (1979), the model of spelling behavior developed by Personke and Yee (1966) meets the central thesis of this study that the integrative nature of spelling demands a multi-channel multi-modality approach.

The basic assumption of the Personke-Yee model is that spelling behavior is generally initiated by one's desire to spell a word. This is the case when a child is asked to spell a word or when, for purposes of written communication, many words must be spelled. However, according to the authors, in order to spell the required word, two input mechanisms must be brought into play. These are the internal input and the external input. The input mechanism is based on the ability to apply phonological and morphological generalizations as well as proof-reading abilities. When the child has difficulty applying the input mechanism, the external input must be brought to play. The external input involves seeking assistance from external sources such as dictionaries, teachers, books, *etc*. to check the correct spelling of a word. Much spelling behavior involves both internal and external mechanisms.

However, according to Personke and Yee, the internal and external inputs are necessary but not sufficient. Processing channels must be utilized as well. There are five such processes which include the memory channel, the memory-kinesthetic detour, the checking channel, the proof-reading channel and the proofreading-rewrite bypass. According to Personke and Yee (1968), these processes are not mutually exclusive but actually complement each other when a student is faced with spelling a word. Thus the efficiency with which a student spells a word is a function of the extent to which he makes use of all these processes.

In the expansion of spelling instruction beyond the traditional approach, and in the examination of crucial instructional skills, there is a need for linguistic instruction to provide phonological, morphological and semantic generalization in spelling. There is also the need to develop visual, tactual and kinesthetic modes, with emphasis on discrimination and memory.

All these skills must be developed to ensure effective instruction and learning in orthography.

C. Statement Of The Problem

The main thesis of this study is that, given effective instruction in which many of the abilities necessary for spelling can be brought to bear within an instructional plan, and given a number of specific instructional strategies in these hypothesized spelling skills, there should be differences in spelling performances, in comparing the multi-channel approach with the traditional approaches, when assessed over time.

Thus, over an eight-week period, three methodologies for spelling instruction were applied to three groups of fifth-grade students. Each group was composed of twenty-six subjects of which thirteen subjects were boys and thirteen subjects were girls. The variables of length and time of daily spelling instruction, chronological age, intelligence, initial spelling achievement, teacher training and experience were all controlled. Each group received twenty-five minutes of daily instruction for four days per week, at the same time each day, for eight weeks. To start with, no significant differences existed for age or intelligence between the groups. Participating teachers had a minimum of ten years of teaching experience and held

Bachelor of Education degrees.

The three methods of spelling instruction applied to the three groups in this investigation were:

1. The Study-Test Approach in which the group received instruction by the traditional basal spelling approach involving a test every Friday. This group was labelled the Control Group.
2. The Test-Study-Test Approach in which the group received instruction in a modified version of the traditional spelling method. The modification included a corrected-test procedure, the compilation of personal word-lists by students and the graphing of test scores. The Friday test was also part of the intervention. This group was labelled Experimental Group 1.
3. The Multi-Channel Multi-Modality Approach in which instruction involved phonological and morphological generalizations as well as semantics. The five processing channels suggested by Personke and Yee were utilized as well as the Fernald multi-sensory approach. A Friday test was also part of the intervention. This group was labelled Experimental Group 2.

The dependent variable of spelling achievement was measured by two norm-referenced tests and a twenty-word informal inventory based on the 160 words of the Grade 5 current basal speller. The norm-referenced tests were the *Stanford Achievement Spelling Test* (Kelley *et al*., 1943) and the *Schonell Graded Word Spelling Test* (Schonell, 1955).

Both tests required the student to write words dictated by the instructor.

It was hypothesized that spelling performance would be a function of the instructional strategies used with each group. The group receiving the most intensive instruction would have superior spelling performance when compared with the middle group which received less intensive instruction and the control group which received the traditional spelling approach. Thus the sample subjects of Experimental Group 2 receiving the multi-channel multi-modality instruction would show superior spelling performance when compared with the middle group (Experimental Group 1) and the Control Group.

D. Specific Hypotheses

1. Experimental Group 2 receiving multi-channel multi-modality instruction will show significantly greater spelling gains at the end of the eight-week period than the Control Group.
2. Experimental Group 2 receiving multi-channel multi-modality instruction will show significantly greater spelling gains at the end of the eight-week period than the Experimental Group 1.
3. Experimental Group 1 will show significantly greater spelling gains than the Control Group but less gain than Experimental Group 2.

4. The Control Group will show the least significant spelling gains when compared with Experimental Group 1 or Experimental Group 2.

E. Summary

In summary, this study is designed to investigate the effectiveness of a multi-channel multi-modality approach to spelling instruction and to compare this mode with two other less intensive approaches. The main thesis is that spelling instruction based on the use of many modalities will be more effective than the traditional approach which focuses on a basal text and a test-study-test approach.

II. LITERATURE REVIEW

A. Overview

This review involves a survey of those factors, present and past, that have directly and indirectly affected the current spelling methodologies. Factors reviewed include a discussion of the evolution of our current orthographical system, an examination of language development and its relationship to spelling, and an investigation of the relevant issues in spelling. Much of the present difficulties in learning the written forms of the American-English language have historical derivations. By understanding how and why our language deviates from a direct sound-symbol correspondence, the teacher will be more able to focus the attention of the pupils on the logical patterns that exist in the vocabulary and specify those words containing illogical spelling patterns that necessitate their learning as separate rote-memory tasks (Chomsky, 1970).

In addition to knowledge of the evolution of English othography, an instructor of spelling must also have knowledge of how language skills develop within a child. Wallace and Larsen (1979) noted the necessity for a constant awareness by the teacher of the child's present stage of development in the progressive and hierarchical growth of language skills, from the levels of comprehension of oral language to the reading and composition of the written forms of language, in order to enhance proficient orthography.

This review also includes a discussion of the relevant issues in spelling. These issues which are the determinants of past, current, and future instructional methodologies include: the regularity or irregularity of the written forms of English, how word lists are most effectively taught, and how spelling skills are transferred to general written work.

Thus the review of the research literature will be conducted under the following headings:

1. Historical Perspective On The Development Of American English Orthography
2. Theories Of Language Development Related To Spelling
3. A Synopsis Of Spelling Development
4. Issues In Spelling Instruction
5. Spelling And Creative Writing

B. A Historical Perspective On The Development Of The American-English Orthography

Introduction

American-English orthography, in its modern form, is a result of the natural growth of the language through cultural evolution. This evolution progressed through three major periods of development: the Old-English period from 450 A.D. to 1150 A.D.; the Middle-English period from 1150 A.D. to 1500 A.D.; and the Modern-English period from 1500

A.D. to the present. The evolution began in ancient England, with the assimilation of vocabulary from the languages of England's invaders. Many of the present orthographical difficulties of English result directly from this assimilation. During the early part of the Modern-English period of language development, England sought to expand its own sphere of influence by pursuing a policy of colonization. Through this policy, the English language was transported with the colonists to North America, where its evolution still continues.

The Old-English Period (450 A.D. To 1150 A.D.)

The Old-English period was a time of numerous invasions of England, with each wave of invaders contributing new words from their vocabulary to the English language. The Celtic invaders were the originators of the language. With the invasions of the Angles, Saxons and Jutes in the middle of the fifth century, the language received a large infusion of Germanic vocabulary. While the Anglo-Saxons had no true written representation of their language, they had an alphabet composed of twenty-four runes or letter characters which were mostly utilized in inscriptions and magic signs (Hanna, Hodges and Moore, 1971). These runes, while not adequate for writing the rapidly expanding Anglo-Saxon language, did represent the orthographical beginnings of the written form of English. The contributions of the Anglo-Saxon vocabulary have remained highly visible in the language surrounding our daily activities and include such words as *child, sleep, drink, make, deed, help, hide* and *cow* (Hillerich, 1976).

In the sixth century, the Anglo-Saxons came under the influence of Christianity with Latin as its official language. A major difference existed between the Anglo-Saxon tongue and Latin. Latin is a highly inflected language, in which the sequence of the words in a sentence is not significant. Inflectional endings added to the words, rather than the word order, reveal their functions as indicators of verb tense, gender, plurality, etc. (Hillerich, 1976). The Latin incorporated into the Anglo-Saxon vocabulary was largely alphabetic, with phonemes directly represented by graphemes (Otto, McMenemy and Smith, 1973). Thus the influence of Latin upon the Anglo-Saxon language was the original source of the present concept of phoneme-grapheme correspondence.

The Anglo-Saxons also modified the Latin alphabet to reflect their own dialects, but retained the direct sound-symbol correspondence of the spoken language. This resulted in the various Anglo-Saxon dialects producing different orthographic forms of the same word. An example of this occurrence was the spelling of the word *bridge*, which was spelled interchangeably as "brycg, bricg, bryj," or "brij" (Hanna, Hodges and Moore, 1971).

The next major influence on the evolution of English results from the Norman invasions of Britain, under William the Conqueror in 1066. With the French-speaking Norman conquerors as the ruling class of England, French became the official language of the royal court, the business world and the legal profession. With regard to spelling, the incorporation of French into the written Anglo-Saxon enlarged the number of existing spelling inconsistencies in the English language, by the inclusion of such words as *give*, *bequeath*, *declare*, *wont*, *salary*, *army* (Hanna, Hodges and Moore, 1971; Hillerich, 1976).

The Middle-English Period (1150 A.D. To 1500 A.D.)

The period of Middle -English, from 1150 A.D. to 1500 A.D., represented a time of major alteration for the English language. It was the period of great grammatical changes. The use of inflected word endings was heavily reduced by the Norman influence. The inflected word endings were converted to a "schwa" sound, then eventually to a "silent e". With the loss of the inflected endings, the position of a word in a sentence became very important. English then began its development as a *word-order* language.

The Modern-English Period (1500 A.D. To 1983 A.D.)

The Modern-English period, which began in 1500 A.D., saw two major occurrences that were to result in the production of many of the present orthographical difficulties. These two occurrences were the great vowel shift and the invention of the printing press.

The great vowel shift was not a sudden event. In 1400, the written forms of English words were still mainly dictated by their pronunciation. However, the pronunciation of the vowel sounds underwent a gradual change through the fifteenth and sixteenth centuries (Hillerich, 1976). As an example of the changes in vowel pronunciation, the word *dime* had been pronounced "/dem/", while the word *root* had been pronounced as "/rot/" prior to the great vowel shift. The end result was a marked change in the late Middle-English pronunciation of words, with the retention of the original written forms. Thus the problems of irregularity in our orthography were increased.

The development of the printing press, and the establishment of the printing industry in England by William Caxton in 1476, resulted in a movement among English printers for a reformation and standardization of orthography (Hillerich, 1976). Since each part of the country spoke its own dialect of English, with corresponding written forms, the result was a lack of uniformity in the spelling of the language. This inconsistency in spelling was a detriment to the printers. In order to overcome this obstacle, the printers arbitrarily chose the East-Midland dialect of London as the language basis for the acceptable standard of spelling. The printers then decreed against any additional spelling changes, which prevented further regularization of the English orthography to correspond to the alterations in pronunciation created by the vowel shifts. Printers, at their convenience, also arbitrarily decided that the patterns of syllabication would conform to their own printing needs.

By the conclusion of the 1500's, dynamic changes had occurred in the English orthography. The pronunciation of the language had changed; spelling had received some standardization; 5,000 French words had been incorporated into the English vocabulary and English had become the official language of daily activities.

The Development Of American-English

The English language was soon to spread over many lands. As the British rulers desired more wealth and power, immigration, with the establishment of North American colonies, became the means of achieving these goals. With the British immigrants came the problem of the inconsistency in the spelling of their language and the desire for standardization of American-English spelling.

The problem of irregularity in American-English orthography was a result of the influx of varied English dialects and their corresponding spellings, plus the addition of language from other immigrants from almost every nation in the world. Two factors were to influence the production of a more standard orthography in North America: the establishment of the printing press and the publication of dictionaries of the English language.

At first, the North American colonists spelled basically according to their own dictates. However, with the establishment of the printing press in 1638 in Cambridge, Massachusettes, a movement began for the creation of a uniform system of spelling, as was the situation in England.

The second stabilizer of orthography, the publication of a series of dictionaries of the English language, occurred in both England and North America. The first dictionary, Dr. Samuel Johnson's *A Dictionary of the English Language*, was published in England in 1755. However, North Americans had need of their own dictionary. Words which developed from their experiences as colonists were not included in the British dictionaries. The settlers had produced labels for new tools, and had added many North American Indian words to their English orthography. Many of these words had meaning only for the colonists. North Americans advanced the standardization of orthography with the contribution from Samuel Johnson's *A School Dictionary*, written in 1798, and Noah Webster's *A Compendious Dictionary of the English Language*, written in 1806. Webster's dictionary encompassed only American-English terms, omitting the many British-English ones that were useless or inappropriate to American life.

As formal education was extended to more people in North America, poor spelling began to be viewed negatively, resulting in the search for effective instructional methods in the teaching of orthography.

Summary

The British-English language evolved through three major historical periods of development: the Old-English, Middle-English and Modern-English periods. The Old-English period was a time of numerous invasions and incorporation of many words from the languages of the invaders into the vocabulary of the British-English people.

As Latin was the contemporary language of learning, it was the basis of the the first written forms of English. Latin was essentially an alphabetic language, with a direct sound-symbol relationship. The present concept of sound-symbol correspondence was derived from the influences of Latin on the Anglo-Saxon vocabulary.

The manner of inserting meaning into the English language also evolved. Old English, with its Latin inheritance, was a highly inflected language, in which the inflections provided the meaning for each sentence. The Middle-English period saw the development of English as a *word-order* language, where the order of the words directed the sentence meaning.

The next significant events in the evolution of the language occurred during the Modern-English period with the great vowel shift in pronunciation of the vocabulary, and the development of a more uniform orthography as a result of the invention of the printing press. The great vowel shift no longer allowed a direct sound-symbol relationship between oral and written English. The printing industry, because of its requirement for standardized spelling, arbitrarily chose one dialect as the acceptable standard of speech and spelling.

When the British colonists immigrated to North America, a similar need for a uniform orthography arose, resulting in the implementation of the same solution as was used in England. The publication of several dictionaries in both England and North America furthered the standardization of spelling and acted as an impetus to literacy.

In the creation of spelling competency, knowledge of the evolution of the English language allows the instructor to simplify the spelling task by focussing the student's attention on the logical relationships which exist in orthography, while specifying the vocabulary that remains a task for rote memorization. To further spelling competency, in addition to the knowledge of the evolution of the English language, the instructor also requires an understanding of how language develops within the child. The next section will review some theories of language development as they relate to spelling.

C. Theories Of Language Development Related To Spelling

Introduction

It is useful for an instructor to possess knowledge of language development, from oral to written, to enable him to understand a child's current stage of orthographical development in various language skills and to present the new orthographical knowledge in a manner that allows transfer of the new skills to create even higher, more complex skill hierarchies within the child. Therefore, models were sought to explain the relationship between oral and written language, in terms of language development and spelling.

There are a number of theories of language development which relate to spelling. Two of these are the genetic theory and the behaviorist theory. They hold extreme positions, claiming that all language is derived from their individual models. A third theoretical position, midway between these two extremes, studies language from the perspective of the child's thoughts. This middle position involves the work of Lev Vygotsky (1962), and as it encompasses aspects of language behavior that could not be satisfactorily incorporated by the extreme theories, it was chosen for elaboration in this study.

The purpose of theoretical models is to exemplify how individuals acquire and structure language and transfer oral language skills to written composition. These models investigate the relationship of oral and written language from a developmental viewpoint and interrelate the spelling of the written language with other orthographical knowledge.

As the language theories do not specifically detail how spelling skills are acquired, a hierarchy of spelling skill development is presented, based on analysis of children's spelling errors. It proceeds from the child's first awareness of written communication to his complete comprehension of sound-symbol relationships in spelling and use of spelling rules.

Genetic Theory

One important model of language development as it relates to spelling is the genetic theory. Its best-known proponent is Noam Chomsky (1972). This theory is also designated as the nativist, generative, rationalist, or mentalist view. The basic assumption of the theory is that a child is an *active*--rather than a *passive* learner, who possesses innate mechanisms or a predisposition for language that provided him with a gradually developing internal awareness of language. The theory suggests that this intuitive predisposition for language in the brain of the child is responsible for most of the language acquisition. This concept is in direct opposition to the behaviorist theory that relies on external stimulation or imitation of external examples to develop language skills.

According to Chomsky (1972), this predisposition for language is present through an innate endowment of an interpretive grammatical schema that is applicable to all known languages and is critical for language development. Chomsky maintains that this schema, which is present at the onset of the child's life, contains a set of linguistic universals or rules in regards to some basic concepts and principles for language operations. Examples of the basic concepts include: innate knowledge of the twenty-plus distinctive features of speech-sounds that compose the vocabulary of all known languages; the grammatical concept of a sentence as requiring a subject and predicate; the principles distinguishing the surface phonological form of a sentence from its deep or logical structure; the principles that allow grammatical transformations of the basic sentence to produce the varied surface forms of active, passive, interrogative and other sentence types that serve to relate deep logical structure to surface structure (Hilgard and Bower, 1975). The surface structure is perceived by Chomsky to be the outward structure of the language, as it appears in written or oral form. The deep structure is the underlying abstract structure, with its lengthly complex chain of inferences that allows the child to understand the deep significance of the surface structure, or to translate the meaning and depth of his ideas into surface structure. As an example, in the sentences:

"Mary was happy." and "Mary was overjoyed."

the surface structure of the two sentences are syntactically similar, but the deep structures indicates a very different meaning for each sentence.

According to the genetic theory, much of the comprehension and use of language is dependent on the presence of the innate linguistic universal grammatical rules and the operation of the complex chains of inferences which develop intuitively and emerge within the child. The inference chains, derived from the linguistic universals, allow the child to transform and comprehend the deep structures to surface structures and *vice versa*. Their operation is incorporated in Chomsky's concept of transformational generative grammar.

The universal rules of grammar are composed of two components: generative grammar and transformational grammar. Rules of generative grammar specify the manner of semantic-syntactic relations among the chosen words for a sentence based on the phrase-structure rules for basic sentence formation in a subject-predicate arrangement. Another set of rules, the transformations, work to reorder the word components to produce the varied sentence types, such as the interrogative form, etc.

Chomsky maintains that the child, by use of inductive evidence, the chain of inferences and the innate interpretive language schema for grammar, extends his knowledge far beyond his experience. However, Chomsky does not believe that he has discovered all the linguistic universals governing language, nor the details of how specific language hypotheses are formulated and tested.

In relationship to spelling methodology, the genetic theory could be interpreted as favoring an indirect instructional approach. In this approach, the child would be provided with many examples and, by use of inductive reasoning and utilization of his innate language schema, would be able to intuitively derive the necessary spelling knowledge, such as rules and sound-symbol relationships and transfer them to new situations. However, spelling instructors are very aware that students do not necessarily achieve competency by provision of many spelling examples, nor do they understand the relationship between the examples. Relative to spelling and general language development, the contribution of the genetic theory was its focus on the gradually expanding internal awareness of the language knowledge by the child.

Proceeding from the genetic theory and its concept of an innate language scheme, an overview of the second extreme theory of language development, the behaviorist theory, will now be provided.

Behaviorist Theory

A second position on language development is in direct opposition to Chomsky's innate view. This position involves the behaviorist theory, also known as the environmentalist, empiricist, or associationist view. Its most renowned proponent is Harvard psychologist B. F. Skinner (1957). The behaviorist theory maintains that the child is a passive learner who, upon receiving external stimulation from his environment, or in imitation of the external examples, makes a response. Therefore, knowledge is perceived as originating in experience and is obtained by the child in a stimulus-response (S-R) association. Learning occurs by positive reinforcement of the response, while negative reinforcement eliminates it. Rewards are utilized as motivators and reinforcers to create desired changes (Skinner, 1957).

In regards to language developmment, the basic premise of the behaviorist theory posits that language is learned by imitation of an external stimulus, resulting in the child's speech being shaped by his or her environment. The role of imitation is primary, with the child modelling his or her language structures on the examples provided by his adult instructors. The adult teacher furthers language learning in the child through specific instruction on language content, pacing of instruction, reinforcement, and provision of context examples. The language instruction is provided through a series of drills, exercises and lectures. The teacher establishes what, when, where, how and why a specific lesson is to be learned. As learning is presumed to be overt and observable, measurement of learning occurs through tests and frequency counts. In regards to language instruction, the behaviorist theory is implemented in the behavior modification and modelling approaches.

The stimulus-response behaviorist theory is criticized by Chomsky as being inconsistent with the manner in which speech actually develops in a child. The use of telegraphic language structures by the child, such as "Daddy gone" instead of "Daddy is gone", are viewed as being incompatible with imitation of adult speech models (Chomsky, 1972).

Chomsky also maintains that a simple chaining together of sentence strings provided through earlier stimulus-response associations is not adequate to account for acquisition and growth of language. Because of these inconsistencies, and also because of the effect of studies that indicates that learning is best achieved by active participation in the lesson by the learner, practical implementation of the behaviorist theory has been sharply reduced (Muma, 1978). However, research findings on certain aspects of spelling instruction indicate the applicability of some aspects of the behaviorist model to spelling methodology.

In regards to a specific spelling approach, the behaviorist model could be interpreted as favoring a direct instructional approach with word lists being learned through imitation and modelling, based on examples provided by the teacher. This procedure would be in agreement with the findings of Hildreth (1955) and Stowitschek and Jobes (1977), which showed that imitation substantially increased the retention of spelling words taught. The behaviorist theory also requires heavy use of motivational devices--such as graphing of test results--to provide a large portion of the reinforcement which was necessary for successful learning of the desired spelling responses. Measurement of learning would be assessed through pre-test and post-test procedures. These needs for spelling motivation and measurement were partly supported by the findings of Ernest Horn (1960). He determined that the self-corrected spelling pre-test acts as a motivating and measuring device, by indicating the specific words that the student needed to study. Horn also noted that the self-corrected pre-test, when it is used, is responsible for ninety-five percent of the child's learning in spelling, due to its motivating and measuring aspects. Lovitt (1975) also noted that reinforcement of correct spelling improved spelling performance. However, relative to spelling and general language development, the major contribution of the behaviorist theory is its focus on the many activities which could be provided by the environment to further language and spelling development by stimulus-response situations and the provision of reinforcement.

Proceeding from the behaviorist theory and its concept of learning by imitation, a detailed examination of the third theory referred to earlier in this chapter, on oral and written language development, follows.

Vygotsky's Theory Of Language Development

Vygotsky's theory of language development, representing a middle position between the theoretical poles, looks at language from the perspective of the child's thoughts (1962). According to Vygotsky, there is a unitary development of language and cognition within the child. Vygotsky sees language as the mediating and guiding factor of all learning. Even thought is considered to be essentially verbal as "thought is born through speech"

(Vygotsky, 1962). Vygotsky perceives speech as existing on two levels--an inner meaningful semantic one, and an external, phonetic, verbalized one. These two planes interact as a unity, each according to its own laws.

(i) The Four Stages

Vygotsky posits four stages in early speech development, which bring the child from the language level of externalized thought processing to internalized and silent thought operations. The first stage is the primitive stage where the child plays with sounds. This is exemplified in the baby jargon, characteristic of young children. The second level is the naive psychology stage. At this level, the child's speech runs ahead of his or her understanding. As an example, he or she might use subordinate clauses initiated by the word "before" or "because", previous to his or her understanding of causal relationships. The third stage, egocentric speech, is made visible by external signs and operations. During this stage, at about two-and-a-half years of age, the child verbalizes long monologues which are unintelligible to others. He or she will also count on fingers, make use of mnemonic aids, etc. The last stage is that of ingrowth where the child ceases the verbalization of his private thoughts and acquires inner, soundless speech at about the age of six years. Thus, Vygotsky perceives that language is internalized with the maturing of thought processes until the child abandons the egocentric speech for inner speech.

The achievement of inner or silent speech is central to Vygotsky's concepts of language acquisition. The main characteristic of inner speech is its distinctive predicated syntax, where the subject of the sentence and all the words connected with it are omitted. "Compared with external speech, inner speech appears disconnected and incomplete" (Vygotsky, 1962). As the speaker understands the intent of the inner predicated thought, it retains its full meaning for him. This form of speech is visible in the spoken exchanges between two people--such as husband and wife--who deeply understand each other. Thus no sharp division exists between inner and external speech; they are interrelated and affect each other. Inner speech is perceived as functioning as a first draft of oral speech, with the external speech of the mature child and adult considered as an expanded version of the inner, soundless thought.

The child who is acquiring language is thought to benefit from the language examples provided by the adult. These adult examples act as a source of ready-made word meanings, which are gradually embodied in the learner's own vocabulary. Adult language also provides new ways of generalizing a situation that a child incorporates and reconstructs according to his or her own concepts. Exposure to the adult language is, therefore, perceived to be an integral part of the child's cognitive development, and dialogue between the adult and the child is encouraged.

With language as a major tool of learning, the child begins to develop the concepts through which he or she would organize his or her world.

(ii) The Development Of Concepts

As the mediating factor in all learning, language is the means that furthers the cognitive and conceptual development in children, and is the tool for logical and analytic thinking. However, formal instruction is the principal source of expansion and evaluation of the child's concepts. Systematic instruction provides the child with knowledge that he or she is not able to see or otherwise experience. This knowledge, through the intermediary of language, transforms or expands the child's internalized concepts of his world. "At any age, a concept embodied in a word represents an act of generalization" (Vygotsky, 1962).

As the word meanings evolves, the primitive generalization of meaning is replaced by consistently higher types that end in the formation of true concepts. Vygotsky contends that instruction in the scientific concepts creates the rudiments of general systemization within the child. With practice, the child is able to transfer this systemization to every day concepts. The establishment of systemization in concepts in turn allows the development of hierarchies of knowledge and the establishment of new spontaneous concepts derived from these hierarchies.

Vygotsky also recognizes that the other complex psychological processes and intellectual functions, such as deliberate attention, logical memory, abstraction, and the ability to think and compare are also simultaneously maturing and furthering language development. However formal instruction, to Vygotsky, is vital to the acquisition of a system of conceptualization. Therefore, in extrapolating from Vygotsky's theory, formal instruction is required to develop the child's concepts of the spelling of the written language and to further the formulation of spontaneous concepts that will allow the transfer of specific spelling skills to general written composition. The development of written language, as perceived by Vygotsky, is based on skills that were already present in the child's oral language.

(iii) The Development Of Written Language

In transferring the learner's language skills from oral to written language, the written communication is basically perceived to be an elaborated form of oral speech. Written communication is more difficult than oral speech because the writer is unable to utilize bodily expression and the situational communication that exist in an oral dialogue. Because the situational advantages of dialogue are lacking and because clarity in understanding the written message depended upon the formal meanings of words, a much greater number of words are required in written communication than oral speech to convey the same idea. Therefore written speech also requires a higher level of abstraction than oral speech, and will need more motivation and direct instruction to overcome this difficulty. The objective of the teacher of language arts will be to extend the student's oral vocabulary in meaning and to help him or her acquire its written form so that the student is able to read and write English as well as he or she speaks it (Kean and Personke, 1976).

As the language theories do not specifically detail how spelling skills are acquired, research on misspellings is utilized to produce a synopsis of spelling development.

A Synopsis Of Spelling Development

The evolution of language acquisition by the child was described by Vygotsky's model of language development. However, a second model is necessary to explain how the child is able to transfer these oral skills to written language. Most of the understanding of the stages of development in written language is derived through an analysis of children's spelling errors. It is postulated that a child's errors in spelling are an indirect reflection of his conceptualization of the relationship between oral and written language and that a new stage in understanding of the use of spelling generalizations is revealed by a change in the child's misspellings (Beers and Henderson, 1980).

While an exact theory is not yet available, Henderson (1980) summarized the stages of development of the spelling of written language, based upon a synopsis of the relevant research findings, from 1966 to 1977, concerning written word-knowledge (Beer and Henderson, 1980). The first stage of written language involves the young child scribbling aimlessly. Later this aimless scribble changes to the drawing of *pictures*, accompanied by the very special scribble that was thought of as writing by the child. At this stage, the learner also points to and asks for the names of letters (Beers and Henderson, 1980).

In the next stage, the pre-reading stage, the child who recognizes the written form of letters reproduces them in varied ways. The most common production involves the jumbled use of letters and numbers, drawn in any directions.

A new stage develops within the child with the discovery of a primitive conceptualization of the composition of a word. The random, directionless letter inventions are replaced by words symbolically spelled by a single letter. The child's word-concept is yet too primitive to allow him to see the details of the letters within the word (Gentry and Henderson, 1978). A more advanced development of the prereading stage involves the use of the correct sound-symbol correspondences for consonants, at ages five and six years.

The next step, occurring between the first and third grade, is known as the phonetic stage (Beers and Beers, 1981). The child spells by direct correspondence between sound and symbol, using letter-name strategy. Thus, *leaf* would be spelled *l-e-f*. A considerably higher level of abstraction is yet to be developed with a strong sense of the word as an object, as this stage still involves very concrete and mechanical behavior, with the letter matching the sound in a left-to-right progression. The letter-name stage, first discovered by Reed (1970) in his doctoral dissertation on *Children's Perceptions of the Sounds of English: Phonology From Three to Six*, is reinforced by Beers and Henderson (1977) in the classroom.

The next step, occurring between the second and fourth grade, as noted by Beers and Henderson (1977), is known as the vowel transition or orthological stage. Long vowels, previously spelled by their letter-names, are now accompanied by a marker or silent letter. The choice of the silent letter is still frequently in error. However, as the words becomes more visually-differentiated, the letter patterns that exist in them begin to be utilized as clues to correct spelling and pronunciation. Thus the */tion/* in *ration* is pronounced */shun/* and not */tie on/*, and the */a/* in *bake* is not pronounced like the */a/* in *back*.

The last stage,as determined by Beers and Beers (1981), begins about the fifth grade at the age of eleven to twelve years, and involves the comprehension of the effect of semantics, syntax, and derivations upon the spelling of the word in sentence context. Understanding of orthography now includes the concept that spelling is controlled by sentence meaning and grammatical structure, as well as phonology. Semantic knowledge entails a growing awareness of the use and formation of past tenses and terms of comparison, plus the recognition and correct spelling of variant forms of a word through increased morphological knowledge.

Summary

Three models were employed to explain the relationship between oral and written language, in terms of the general development of language and spelling skills. Each theory of language contributed to our understanding of language development.

The major contribution of the genetic theory is its focus on the gradually expanding internal awareness of language knowledge within the child. The behaviorist theory emphasizes the many stimulus-response activities that could be provided by the environment to further language and spelling development, when motivated by reinforcement. Vygotsky's theoretical position on language acquisition was chosen by the investigator as a representation of the middle ground between the extreme positions of the genetics and behaviorist theories. For Vygotsky, language acted as the mediator of all learning experience. He views the language and thoughts of the child as requiring verbalization until such time that the child's maturation allowed him or her to achieve inner speech. Inner language is perceived as a thought rehearsal or first draft for more mature, elaborated forms of oral and written communication. Comprehension of written communication depends upon precise wordings and orthographical skill to overcome the lack of the situational clues present in conversation. When extrapolated to spelling instruction, Vygotsky views conceptual hierarchies and spontaneous transfer of learning from these hierarchies as requiring specific methodological instruction.

The acquisition of written skills follows the development of oral language. The sequence of spelling development, as indicated by Henderson, is based upon the results of research on spelling errors. In this sequence, the initial aimless scribbling of the child is replaced by picture drawings accompanied by scribble messages, then by the production of letters and numbers without regard to direction. True spelling begins by using the direct sound-symbol strategies, to which the knowledge of vowel transitions are later added. The mature speller is able to utilize full linguistic knowledge when spelling.

In conclusion, comprehension of the language system, both oral and written, progresses through stages of development. This sequence of concept development, according to Vygotsky, is furthered and enriched by formal instruction, thus indicating the need to determine the most efficient methodologies in spelling for the purposes of attaining spelling competency in children.

D. Issues In Spelling Instruction

Introduction

Language theories are not the only factors that affect spelling methodologies. Current and past issues in spelling instruction have a direct effect upon the establishment of methodology. Methodological practices act as a response to the acquisition of knowledge in research on factors affecting spelling proficiency. The major factors include debate on the regularity or irregularity of orthography, and whether spelling efficiency is best attained through a phonetic and generalization approach or by the visual whole-word method. Resulting from the debate on regularity *versus* irregularity of spelling are several other issues which include: whether or not spelling competency is best obtained through direct instruction or by incidental means, by study of isolated words in word-lists or by words used in context, or whether spelling vocabulary should be grouped and studied according to linguistic principles. The methodology used by the teacher of spelling greatly depends upon his viewpoint on these issues.

E. The Issue Of Regularity Versus Irregularity In Orthography

The establishment of frequency-of-usage spelling word lists in the 1900's naturally led to a debate on the most efficient instructional approach for the achievement of spelling competence in elementary school students. The concept of the composition of an efficient word-study technique and spelling methodology utilized by an instructor varies according to whether the instructor views American-English orthography as being highly irregular or regular in sound-symbol relationships. In trying to reach some consensus on this topic, there are several types of evidence that have to be appraised, including the uniformity in English orthography, and the effectiveness of teaching spelling rules *versus* the whole-word approach.

The Irregularity

Some investigators, such as Ernest Horn (1957), view spelling as highly irregular. By declaring the orthographical system of English to be irregular, Horn perceives that the sound-symbol correspondence of the language is so loosely related that it is of little value as a tool for spelling. Many of the words that do not possess a direct sound-symbol correspondence appeared in the frequency-of-usage lists, and Horn perceives that it is most important for students to acquire successful orthography of these words. With his perception of orthography as irregular, Horn maintains that spelling competence should be achieved through a whole word or sight word approach which utilizes the haptic and visual channels. Horn (1960), supported by Otto, McMenemy and Smith (1973), Tovey (1978) and Johnson, Langford and Quorn (1981), view instruction by phonemic generalizations and the use of spelling rules as having limited value. Horn specifies several orthographical obstacles in teaching by use of phonetic generalizations. He notes that over one-third of the English words have more than one acceptable pronunciation, due to dialectic differences. He also states that most sounds in the English phonological system can be produced by a variety of spellings. He emphasizes the difficulties for the student in the selection of a correct grapheme when a phoneme could be represented by more than one arrangement of graphemes, or when the phoneme is altered by its inclusion in an unstressed syllable as a *schwa* or short /i/ sound. Horn (1957) also observes that phonemic exceptions were present even in the most common words, and that the majority of American-English words contained one silent letter. He further points out that one-sixth of American-English words are spelled with double letters even though only one of the double letters was pronounced. Horn reminds educators that any spelling rule could be used incorrectly as well as correctly. However, he recognizes the consistency of such spelling elements as prefixes and suffixes. Tovey (1978) supported Horn's findings on irregularity when Tovey analyzed 619 misspelled words and found that fifty-three percent of the errors that occurred were through the spelling of words according to their sound-symbol relationship.

The Alphabetic Principle And Regularity

Contrary to the view of Horn that English orthography is irregular, other researchers perceive American-English to be basically alphabetic, and to follow the alphabetic principle. Hanna, Hodges and Hanna (1971) define the alphabetic principle as the principle of using graphemes to signify phonemes which underlie many written forms of a language. In an ideal relationship, each phoneme would be represented by its own distinctive grapheme. In such a situation, the written word would be a true visual symbolization of the spoken form. Hanna and Moore (1953), as advocates of the regularity of English orthography, state that when a child begins learning to spell by relating sound to written symbol, he or she is soon able to instinctively derive the spelling of most of the words that he or she is able to pronounce. Boyd and Talbot (1971), Markoff (1976) and Wallace and Larsen (1979) agreed that in order to achieve effective spelling--whether in oral or written form--requires an understanding of the functional correspondence of sounds to letters. In a confirmation of the Hanna-Moore position (1953), Whiting and Jarrico (1980), in an investigation of normal readers, determined that the average number of correctly-spelled words from a normal reader's sight vocabulary or word-recognition vocabulary ranges from eighty percent to ninety-one percent. Furthermore, good phonetic equivalents of spelling are present for ninety percent of the misspellings among third-

and fourth-grade students, seventy-five percent in the fifth grade, and eighty-two percent in the sixth grade.

Research On The Alphabetic Principle And Phoneme-Grapheme Correspondence

To ascertain if there is any scientific foundation to the existence of the alphabetic principle in American-English and in the belief of phoneme-grapheme relationships, Hanna and Moore (1953), analyzed a 3,000 word vocabulary based on frequency-of-usage in adults' and children's writings, to determine the extent to which each phoneme was represented consistently or regularly by a specific grapheme or combination of graphemes. The regular spelling for a phoneme was accepted as the letter or combination of letters most frequently used to represent it. The measure of grapheme-phoneme correspondence was determined by relating the number of different spellings of a given phoneme to the frequency with which these different spellings occurred. As an example, Hanna and Moore declared the phoneme */e/* as in *pet* to have seven different spellings. The main findings of this study were that:

1. Roughly four-fifths of the phonemes contained in the words comprising the traditional spelling vocabulary of the elementary school child approximated the alphabetic principle in their letter representations.

2. Approximately one-fifth of the phonemes contained in the words comprising the spelling vocabulary deviated substantially from the alphabetic principle in their letter representations.

3. Nearly three-fourths of the vowel phonemes did not represent significant spelling problems, since they had

a consistent letter representation from about fifty-seven percent to about ninety-nine percent of the times they occurred.

4. About eighty-two percent of the consonant clusters had only one spelling (examples: */st/*, */ch/*).

5. Single-consonant phonemes were represented by consistent spelling about nine-tenths of the time they occurred (examples included: */b/*, */d/*, */h/*, */l/*, */m/*, */n/*, */p/*, */r /*, */t/*) (Hanna, Hodges and Hanna, 1971).

The main concern of this study was that the phoneme-grapheme correspondence showed enough consistency to be utilized in the teaching of spelling.

Critics have challenged the findings of the Hanna-Moore study (1953) on the basis that the sample of 3,000 words was too small. The critics assume that a larger vocabulary of 8,000 words or more would include more complex words and would therefore display less consistency. To support this hypothesis, Ernest Horn (1957) conducted a study involving a sample of 10,000 words. In an analysis of the data, Horn agreed essentially with Moore's findings as to the most frequent graphemic spellings of sounds but disagreed considerably on the number of different spellings for each sound, and the inclusion of certain words under the regular category since they contained the common spelling of a sound less than fifty percent of the time. With Horn's 10,000 word sample, it would have been much more difficult to classify a word as having regular spelling since over a third of the sample words had more than one pronunciation.

To check the validity of the criticism levelled against the Hanna-Moore study by Horn, a two-phase project called

Project 199 or the Stanford Project was conducted by Hodges and Rudorf (1964). The Stanford study refined and extended the basic research initiated by Hanna and Moore in the alphabetic base of American-English orthography, by analyzing more than 17,000 words for phoneme-grapheme correspondence. The Phase I analysis determined the degree to which the spelling of phonemes were affected by their position in the word, and the degree to which the direct sound-symbol correspondence was affected by the placement of the syllable or word stress. The results of the study indicated a high degree of consistency in phoneme-grapheme relationships when the factors of phoneme position in syllables and multi-syllable words, and the degree of stress on the syllable were considered. Hodges concluded that eighty percent or more of the consonants had a single spelling, while very few vowel sounds had single spellings. However, when the effect of phoneme position in a syllable was taken into account, the findings concluded that many phonemes--particularly vowels--have quite predictable spellings in certain positions. An example of the predictability of the sound of */a/* was given as eighty-one percent when */a/* ends a syllable which does not end a word (example: *apron*).

In Phase II, Rudorf further examined the validity of the phoneme-grapheme relationships by programming a computer to spell the 17,000 words, based upon the alphabetic correspondence found in Phase I. A set of rules or algorithms was constructed for each phoneme (Hodges, 1966). Using the phonological input from Phase I, the computer was able to spell 49.8 percent of the words correctly, 37.2 percent with one error, 11.4 percent with two errors and 2.3 percent with three errors or more. Rudorf concluded that the results of the research strengthened the position for use of the phonological and generalization approach to the teaching of spelling since many of the errors that did occur could have been eradicated by mastery of simple morphological rules. The fact that no morphological or contextual information was programmed was considered to be a deficit by the investigators as they posited that morphological and contextual information was necessary to master orthography.

In another study collaborating the regularity of some aspects of the phoneme-grapheme relationships as expressed by the alphabetic principle, Clymer (1963) examined the teacher's editions of four basal reading texts. He found that twenty-four of the forty-five generalizations taught within the context of the four basal texts were vowel generalizations. In examining the vocabulary of the textbooks to assess how frequently the vowel generalizations followed the rules and using seventy-five percent occurrence as the criterion for a true generalization, Clymer found that only six of the twenty-four, or twenty-five percent of the vowel generalizations, attained the criterion for being a true generalization. Clymer's conclusions were reinforced by Baily (1965), who applied Clymer's list of generalizations to eight reading programs through the sixth grade. His findings were consistent with those of Clymer.

To determine the reliability of the alphabetic principle regarding consonant sounds, Hillerich (1976) had used the findings reported by Dewy in the *Relative Frequency of English Spellings* (1970) to arrange the consonant and vowel sounds according to their spelling, based on the frequency of their occurrence. Hillerich concluded that more than a third of the consonant sounds were spelled in only one way, and the consonant sounds */ch/, /f/, /h/ and /j/* have only two possible spellings. Hillerich concluded that fairly reliable generalizations could be taught for about half the initial consonant sounds.

Summary.

The debate on the regularity or irregularity of the phoneme-grapheme relationship, as indicated by the alphabetic principle, is of prime importance to the spelling methodology pursued by the teacher. While Horn posited that American-English orthography is too irregular for phonetic instruction in spelling to be beneficial, the Stanford Project, under Hanna, Moore, Hodges and Rudorf, indicated that the consonant sounds show a high phoneme-grapheme consistency and that algorithms, based on generalization rules, could be successfully utilized as a spelling tool, particularly when morphological and contextual information are included. However, few vowel generalizations, as seen by other studies, reach the criterion of being a true generalization. These findings of the applicability of phoneme-grapheme correspondence were specifically tested in relationship to spelling achievement.

Practical Application Of The Previous Research Findings

Some research has been carried out that specifically deals with spelling achievement through the use of a phonological methodology, based on the assumption of the regularity of American-English orthography. Spelling achievement attained by the phonological or a generalization approach was compared to to the achievement by the whole-word approach or a non-phonetic approach.

One such researcher, Personke (1962), compared the spelling achievement of Scottish children who received reading and spelling instruction through a phonological approach, to American children who received reading through a whole-word approach and spelling instruction based on interest units. The chronological ages of the sample subjects were seven, eleven and fourteen years. The findings revealed that the Scottish sample showed superiority until age fourteen, when the difference was no longer significant. Personke attributed the superiority of the Scottish students to early phonemic instruction, which gave them a spelling advantage that was not eliminated by years in school or maturation. He maintained that the advantages of phonetic instruction outweighed its disadvantages.

Hillerich (1966) compared Grades 4 to 6 spelling achievement by a word list approach *versus* a generalization approach, during a one-year period of instruction. The test of comparison included twenty words common to both spelling programs. The word list group showed superior spelling achievement at all grade levels, in both studied and unstudied words, but the largest difference was evident in their superiority in spelling the unstudied words. In a follow-up study involving Grades 2 to 5, Hillerich (1977) again obtained results in which the word list approach attained greater spelling success in both the studied and unstudied words, in every grade.

Yee (1969) compared spelling achievement by a phonetic *versus* non-phonetic approach, in grades 2 to 6. To provide the students with the necessary skills to utilize a phonetic approach to spelling, two specific generalizations were taught per grade. The ability of the children to spell words that involved these generalizations, as well as words that were non-phonetic, was then measured. The test measure included three categories of words: (a) phonetic spellings which followed the rules, (b) tricky words which were nearly phonetic in structure but would result in errors if generalizations were directly applied, and (c) words which had no relationship to the generalizations taught. The achievement results indicated no significant difference in the number of correctly spelled words which had utilized the instructed phonetic generalizations as compared to the number of correctly spelled words which had required an adaptation of the instructed generalizations or no relationship to them. Yee concluded that the advantage of phonetic over non-phonetic instruction was questionable and that the study method of the student probably was more important than the generalization instruction.

Simon and Simon (1973) compared spelling achievement attained through use of the Rudorf (1965) algorithms or generalizations with the actual achievement of students, in grades 2 to 5, on fourth grade spelling list-words. Three categories of words were tested: (a) the basic spelling list-words, (b) review words, (c) and supplementary words from other courses. In all three categories, strict use of only the algorithms resulted in far more errors than were produced by the average pupil. Simon and Simon concluded that strict use of the Rudorf algorithms would provide little help to fourth grade children in spelling new, unfamiliar words.

Summary

The regularity *versus* irregularity controversy surrounding American-English orthography has yet to reach any definite conclusions. However, neither the proponents of regularity or irregularity viewpoint have advocated their concepts to the total exclusion of the other. Even Horn (1960), a strong defender of the whole-word, visual-haptic approach, concedes that, "Both theory and evidence suggest that some kind and amount of phonetic instruction, as yet undetermined, may be of substantial benefit to spelling" (p. 1345). However, each proponent in the debate maintained that his approach should be primary in spelling instruction. He perceived the concepts of the other view for acquiring spelling competency as having secondary value and being utilized as a supportive tool to his main approach.

Even though the research on the regularity *versus* irregularity issue was inconclusive, it caused several controversies to emerge.

F. Other Related Research

Introduction

The search for the most efficient spelling methodology encompasses aspects other than the whole-word approach, as compared to the phonological and generalization approach. These other aspects include instruction by list *versus* contextual study, direct *versus* incidental instruction, and strategies for bringing about the transfer of isolated spelling skills to general written work. The spelling methodology practiced by the instructor, and the degree of spelling competency achieved by the students are a function of these related issues.

List Versus Contextual Study

A major methodological gulf exists between the positions of spelling instruction by word list *versus* context. If an instructor presumes sentence context and word meaning to be critical for spelling achievement, then the teacher would be required to pursue a more semantic approach to spelling instruction. If it is assumed that a student could achieve efficiency by focussing on the letter sequence of the list-words, then linguistic instruction is very minimal.

Hildreth (1955) noted a strong need to learn spelling within its normal written context. Hildreth stated that spelling, when divorced from its context of meaning in writing, becomes a meaningless exercise, and noted further that word difficulty was relative to the knowledge of meaning and the significance of the word for the learner. Knowledge of word meanings and their usage in English grammar allowed increased spelling proficiency. A child who says, "I gotta" for "I have got to" may spell this phrase in the same manner, due to a failure to recognize the expression as a four-word unit.

Chomsky (1970) and Cramer (1976) posited that the use of sentence context was necessary to allow the child to learn the variant phonetic forms of a word, particularly the polysyllabic-derived forms, and to internalize the phonology of his language. Chomsky stated that the poor speller achieved greater success by looking for regularities in words as used in sentence context, than by memorization of words as isolated examples.

While some investigators supported the methodology of developing spelling through word meaning and sentence context, there were some critics. Horn (1960), Hillerich (1976) and Johnson, Langford and Quorn (1981) stated that the list form was superior to sentence context for learning spelling words. Their supportive evidence was that most of the word meanings in the basic spelling vocabulary from the first to the sixth grade would be known to the students and used in their written work. Unknown vocabulary required oral development by the teacher and by the use of the dictionary. Therefore, Horn and Hillerich declared the arbitrary practice of developing word meanings and use of sentence context to be a waste of time. Johnson *et al* also maintained that the presentation of spelling words in context actually reduced scrutiny of them by the learner.

The issue of developing spelling efficiency through word lists *versus* sentence context implies that some type of direct instruction is necessary. This implication forms the basis of another issue--of whether spelling competency is best achieved by direct or incidental instruction.

Direct Versus Incidental Instruction

Little research is available on the effect of direct *versus* incidental instruction. Most researchers initiated their studies from a position of direct instruction and then manipulated variables to see the effect upon instruction. However, Cramer (1970) compared an informal language experience approach with formal teaching of spelling in the first grade. The results of the study indicated that the sugjects involved in the language-experience approach performed significantly better on both regular and irregular spelling than did the students receiving formal instruction.

As an advocate of direct instruction, Peters (1975) posited that, if it was widely accepted that attainment of reading efficiency required carefully-programmed instruction, then the inefficient speller required an even more systematically planned program of instruction to overcome his problems. She stated that for a child to succeed in spelling, there must be a directed plan of word attack and a strategy by which words are to be learned.

The issue of direct *versus* incidental instruction in spelling has resulted from a search for the most effective procedures for the attainment of spelling competence. This competence is desired both in specific spelling vocabulary and its transfer to general written work.

Transfer Of Spelling Skills To General Written Work

In regards to the transfer of spelling skills, Cramer (1976), Hillerich (1977) and Mann, Suiter and McClung (1979) noted that students required much practice using words functionally in writing before they were able to revisualize the needed words for the production of an automatic response. Johnson, Lanford and Quorn (1981) maintained that daily writing was required in order to further spelling competency.

Mann *et al* and Marino (1981) also stated that transfer of spelling knowledge was furthered by consideration of the personal modality best suited to each student. They recommended that children experiencing visual spelling difficulties should be taught through use of the auditory channel, and *vice versa* for children experiencing problems in the auditory channel.

Donoghue (1979), Beers and Beers (1981) and Johnson, Langford and Quorn (1981) stated that word lists should be linked to words currently used or misspelled by students in their writing. This creates the transfer of skills which does not ordinarily occur when students spelled words only as an act of rote memorization in learning spelling word lists.

A second aspect in the transfer of spelling skills to general written work is an area of even more controversy. Divergent opinions exist on the degree to which spelling should be marked in creative writing, on the procedure for establishing the closest spelling of a needed word during the writing act without creating a conceptual break, and on the necessity and method of proofing for spelling errors.

With regards to the marking of spelling in creative writing, Peters (1975) stated that non-standard spelling in creative writing should not be accepted. She argued that children were only free to write when they have efficient spelling skills.

Cramer (1976), Hillerich (1977) and Groff (1979) opposed the position of Peters. They maintained that no corrections should be made on children's creative writing papers and that misspellings in the early grades should be overlooked, in favor of attaining thorough fluency. Hillerich posited that the child who wrote frequently, with no correction, produced longer and more creative sentences, while making no more mechanical errors than the child who received correction.

While disagreement exists on the marking of spelling in creative writing, there is considerable agreement on the need for the development of proofreading skills and spelling consciousness in written communication, and the positive effect of proofreading in furthering the transfer of isolated spelling skills to written composition. Agreement is also general on the need to develop a procedure for retrieving a needed word during the writing act. Proofreading is perceived as a process that occurs at the conclusion of the writing of the first draft of composition, and involves a specific examination of the composition for possible errors. Spelling consciousness involves the visual recognition of misspelling when proofreading the composition. Peters (1975), Donoghue (1979), and Weis and Weis (1982) noted the necessity for the development of proofreading skills in spelling, and their effect on the transfer of spelling skills to general written work. They also noted the difficulty of establishing the habit of self-correction. Therefore, a number of *proofreading* plans have been produced which allow the writer freedom to express his or her ideas without interruption but which result in an edited and proofread product. When Personke and Knight (1967) conducted a study on proofreading and spelling, they followed the lesson procedure of having the experimental students write their *best guess* of the needed words, based upon information charts of common spellings of English sounds. Both the experimental and control groups then wrote a composition, in which the experimental group followed the best-guess procedure for solving an immediate spelling need. The first draft was then proofread by the students for spelling errors. In the edited draft, the students of the experimental group used more words with greater word variety in less time and with fifty percent fewer errors than did the control group. In support of these findings, Simon and Simon (1973), Cramer (1976), Johnson, Langford and Quorn (1981) and Marino (1981) were also advocates of the best-guess procedure, also known as the *generate-and-test* or *check-guess procedure* for word retrieval. Cramer stated that the children who attained superior spelling had utilized the best-guess approach in meeting spelling needs.

Peters (1975) advocated that the teacher should write on the student's paper any needed word. This would eliminate any conceptual break which would occur if the student was required to use a dictionary to find the correct spelling, and would indicate a desire for correct spelling on the part of both teacher and student. With spelling tensions thus eliminated, the student would be free to express his or her written ideas, using whatever words he desired.

Another suggestion that avoids a concept break in writing for a spelling requirement was for the student to underline the words which contained uncertain spelling and return to proofread these words for correct spelling when the composition was completed. Kean and Personke (1976) suggested that the proofreading aspect of the composition should be carried out during spelling class rather than lumped together with the editing of form of the written work.

Marino (1981) posited a logical compromise regarding proofreading for errors in composition. She maintained that spelling errors should be overlooked in the initial writing but that proofreading for errors was required before the paper was handed in for marking by the teacher as a finished work. Beers and Beers (1981) agreed with Marino's position on proofreading.

Summary

The question of the achievement of spelling competency is affected by a number of issues. These issues include the attainment of a spelling vocabulary through study of word lists *versus* sentence context, direct *versus* incidental instruction, and how to effect the general transfer of isolated spelling skills to written work. Opinion was divided on the issue of studying spelling vocabulary through word list *versus* sentence context and research on the effects of direct *versus* incidental instruction was sparse. It appears that formal spelling instruction is of little value in the first grade, but is probably a requirement for the teaching of spelling in other grades. Divergence of opinions also occur on the question of marking spelling in creative writing. However, a consensus existed among the researchers on the need for proofreading skills and a method of word retrieval which does not create a conceptual break in the writing act. Any methodology which could effect the achievement of spelling competency and the transfer of isolated spelling skills to general written work would be highly regarded.

III. THEORIES OF SPELLING METHODOLOGIES

A. Overview

This chapter reviews the theories upon which spelling practice is based, and furnishes a description of several models of spelling behavior. The Personke-Yee model of spelling behavior was chosen for elaboration as it is consistent with the hypothesis of this study. The elaboration includes a rationale for multi-channel multi-modality spelling instruction. It also includes the *Information Processing Model* to which the Personke-Yee model is related. The chapter further reviews the research literature related to the multi-channel multi-modality approach and its implications for spelling instruction.

The chapter is classified under the following main headings:

1. Synopsis Of Some Theories of Spelling Behavior
2. Multi-Channel Multi-Modality Instruction
3. Chapter Summary

B. Synopsis Of Some Theories Of Spelling Behavior

Introduction

Models of spelling behavior have been designed by educators for several reasons. Efficiency in spelling instruction requires that a teacher understand the spelling act (Wallace and Larsen, 1979). Comprehension of the spelling act allows an instructor to assist a student in learning a difficult word or in achieving spelling competency, by providing the teacher with specific knowledge of where breakdowns in the act of spelling occurred, and what could be done to remediate or bypass these problems. While a number of theories have been developed, very few of these theories encompass the totality of spelling behavior. One such early theory is that of Brothers and Holsclaw.

The Brothers And Holsclaw Theory

The theory of spelling behavior produced by Brothers and Holsclaw (1969) involve two aspects of spelling: the use of spelling in written composition and the mastery of spelling vocabulary. These investigators perceive that a person in the act of spelling could utilize any of five behaviors to produce a needed word, including: copying, proofreading, rewriting, writing from memory, and automatic spelling. The behavior of copying required writing a word to match a printed or dictated one. The behavior of proofreading was necessary in assessing whether or not written words were correctly spelled. The rewriting behavior involved error correction following proofreading. A fourth alternative, writing from memory, required a conscious halt to the writing action to recall a letter sequence or appropriate rule. The automatic spelling behavior involved the instantaneous writing of a word with no conscious thought of spelling requirements. A person could use any or all of these five behaviors in the first draft of any written communication.

The five spelling behaviors were also involved in the mastery of spelling word lists. In the study of spelling vocabulary, the student was perceived as applying each of the five behaviors in rapid succession in the learning of a single word. However, Brothers and Holsclaw noted that a spelling vocabulary based solely on the study of list words by the utilization of the five behaviors held specific weaknesses. These included the lack of extensive practice with the list word, and isolation of the word from its meaning. Brothers and Holsclaw suggested that experiences for learning spelling should be provided in a meaningful language-arts context, to create transfer of specific list word skills to general written work. Within the language experiences, the student would be expected to copy, proofread and rewrite--where necessary--in order to achieve spelling accuracy after the initial draft of his written communication.

While the Brothers and Holsclaw model of spelling enunciates behaviors for the production of an accurate written form, information on how a child processes input to initiate the spelling action is missing. Two other theories of spelling behavior by Simon and Simon, and by Nicholson and Schachter attempt to compensate for the drawbacks.

The Simon And Simon Theory Of Generate And Test

The Simon and Simon model (1973) of spelling behavior focused on information processing through cognitive and linguistic means. This model posited four types of processing, based on information available in memory storage. These processes included direct recall of a needed spelling word, direct phonemic spelling in possible co-ordination with semantic information provided by sentence context, morphological information combined with phonemic associations, and word recognition.

The process of direct recall, in association with long-term memory for the word pronunciation and meaning, was the simplest. If direct recall could not be implemented, direct phonemic spelling was an alternative. This spelling was based on stored phoneme-grapheme associations, supplemented by internalized rules--either implicit or explicit--which directed the conditions of a particular letter or grapheme combination to represent a specific phoneme sound. Direct recall or direct phonemic spelling could be modified upon the introduction of morphemic information. Auditory recognition of morphemic word-components acted as an aid to spelling the component sounds when they re-appeared in other words.

The process of word recognition was applied as a fourth alternative for spelling production. Using this process the student would generate several alternative spellings of a word, and by the use of word recognition, based on incomplete visual information stored in memory from reading, would recognize the correct form of the word when he or she saw it.

Each of these alternative spelling processes had disadvantages. The disadvantage of direct recall was the requirement for heavy rote-memorization which could result in a possible memory overload. Phonemic spelling also had a disadvantage. Direct phonemic production could create phonetically accurate but incorrect spellings of a word. However, phonemic spelling, combined with morphological information produced greater spelling accuracy. The advantage of the generate-and-test process was that the speller was not required to possess full information about the word but need only be able to recognize its correct visual form, particularly in context, from among a number of alternatives. This allowed the speller to select the correct spelling form of the needed word from the memory store of partial information, which was obtained from reading. Another model of spelling behavior, by Nicholson and Schachter encompassed several of the concepts of Simon and Simon, but contained much less detail of the processing involved in the production of a needed spelling of a word.

The Nicholson And Schachter Theory

A model of the spelling process was also presented by Nicholson and Schachter (1979). The Nicholson and Schachter model perceived spellers as utilizing three kinds of knowledge in the production of a needed word: language knowledge, internalized rules, and visual associations.

The language knowledge, as the first component of the spelling process, involved the information on underlying language structures which children had acquired by school-age. This language competence enabled them to understand English words, assign meaning to sounds and know whether or not a word sounded correct when spoken.

The second component of knowledge, the internalized rules, could be acquired by either inductive or deductive means, and be either implicit or explicit. These rules enabled the speller to predict and write the most probable spellings for words.

The third knowledge component--visual associations--referred to a type of mental, visual dictionary present in the speller and which contained the graphic forms of words, including the grapheme combinations present in irregularly spelled words. These unpredictable spellings were learned as unique structures and were associated with other sets of words which contained the irregular spellings. The visual associations provide a means of checking and proofreading against the probabilistic spelling of a needed word, in order to see if it looked correct.

Nicholson and Schachter recognized that solitary use of any of the processes involving language knowledge, internalized rules, or visual associations would not produce proficient spelling behavior. They recommended that teaching activities should be based on all three kinds of knowledge.

Summary

The Brothers and Holsclaw, Simon and Simon and the Nicholson and Schachter models of spelling behavior share some common concepts. All the models view the speller as requiring the use of several alternative processes to produce a needed spelling word in correct form. The Simon and Simon and the Nicholson and Schachter models perceive linguistic knowledge to be basic to this processing and that a set of internalized, phonemic rules, either implicit or explicit, function to produce a number of probabilistic spellings of a word. Both models also agree on the role of word recognition in choosing the correct visual production of a word from among alternative forms. Both theories are also in general agreement on the need to structure teaching activities to provide the totality of linguistic information, concerning regularly and irregularly spelled words, and to encourage use of this information in the generate-and-test approach to spelling. The Brothers and Holsclaw theory provide for the transfer of word list skills to general written communication by the incorporation of list words into the written language-arts experience.

By their common agreement on the necessity of incorporating a number of processes in the spelling act, all the theories indirectly support the need for a multi-channel multi-modality instructional approach in spelling.

C. The Multi-Channel Multi-Modality Theory

Introduction

The concept of spelling as a complex operation is well documented by prominent language-arts specialists. Johnson and Myklebust (1967) stated:

> Spelling requires more auditory and visual discrimination, memory, sequentialization, analysis and synthesis, and integration simultaneously than perhaps any other skill. (p. 239).

Hodges (1965) and Markoff (1976) reinforced this concept of spelling as a complicated behavior. They perceived that the spelling of a word, which began with a stimulus received by eyes and ears and reinforced by the haptical sense of touch and kinesthetics, proceeded through a complex information processing act in order to produce a written word response. To cover the totality of these complicated spelling operations, language-art specialists note that an efficient instructional methodology requires the utilization of a number of cognitive processes and channels (Markoff, 1976; Wallace and Larsen, 1979; Henderson and Beers, 1980).

Broad guidelines for the components of a comprehensive multi-channel multi-modality theory of spelling behavior have been provided by many of the language-arts specialists and researchers cited earlier. These sources observed that a complete theory of spelling has to indicate how a student processed the relevant spelling information that he or she already possesses, plus the manner in which new information is sought and accommodated (Hodges, 1965). The assimilation of new information is perceived to involve the skills of auditory and visual perception, memory, sequentialization, analysis and synthesis (Johnson and Myklebust, 1967; Howell and Kaplan, 1980). Hodges (1965) and Markoff (1976) also stress the necessity for the employment of multi-sensory input as an aid to spelling competency, noting that any or all of the sensory modes utilized in learning the word would aid in its recall for writing purposes. In addition, linguistic skills are required, including phonology, morphology and semantics (Nicholson, 1979; Howell and Kaplan, 1980). Furthermore, as general spelling competency is enhanced by the ability to generate probabilistic spellings of a needed word, by good dictionary skills and proofreading skills, these skill areas are also emphasized in most models (Brothers and Holsclaw, 1969; Simon and Simon, 1973; Howell and Kaplan, 1980).

In recommending a theory of spelling which perceives these processes as basic components in the totality of spelling behavior, Wallace and Larsen (1979) recognize the Personke-Yee model of spelling, based on the information-processing system, as one of the most complete models yet formulated. The information-processing model posit that information is received and acted upon through the use of three cognitive channels: input, processing and output. In this way, spelling behavior can thus also be viewed within the framework of this information-processing act.

Spelling As An Information-Processing Act

Spelling behavior, in relationship to the information-processing system, is composed of five logical steps or phases. The first phase--the initial *input* processing--involves the determination of a problem requiring a solution. The recognition of the problem set in motion phase two, which includes a processing of the available information for *problem-solving* strategies. This entails deciding what courses of action to consider and take. The next phase of the act requires *decision-making* in regard to two aspects: what information is available to aid spelling, and the choice of channels and course of action which would be appropriate to the spelling need. The last part of the act--the *output* processing--is completed in two steps or phases: the execution of an action and feedback on the action. The fourth phase, the execution of the selected behavior, involves the spelling of the word. The fifth phase, the *feedback* of information, requires the evaluation of the written response by employment of external outside references, or by internal self-evaluation.

The basic assumption of this model is that the spelling behavior is initiated by the need to spell a word. When spelling behavior is invoked, the first three phases--the need to spell, the processing of information, and decision-making--always occur in the same order. The completion of the decision in phase three is followed by a divergence of choices for the execution or output of the spelling act, dependent upon the requirements of the speller for completion of the needed word. The letter sequence of the written word is then checked for accuracy against a referral source.

Each of these phases of spelling, as part of the information-processing act, is incorporated into the Personke-Yee model of spelling behavior.

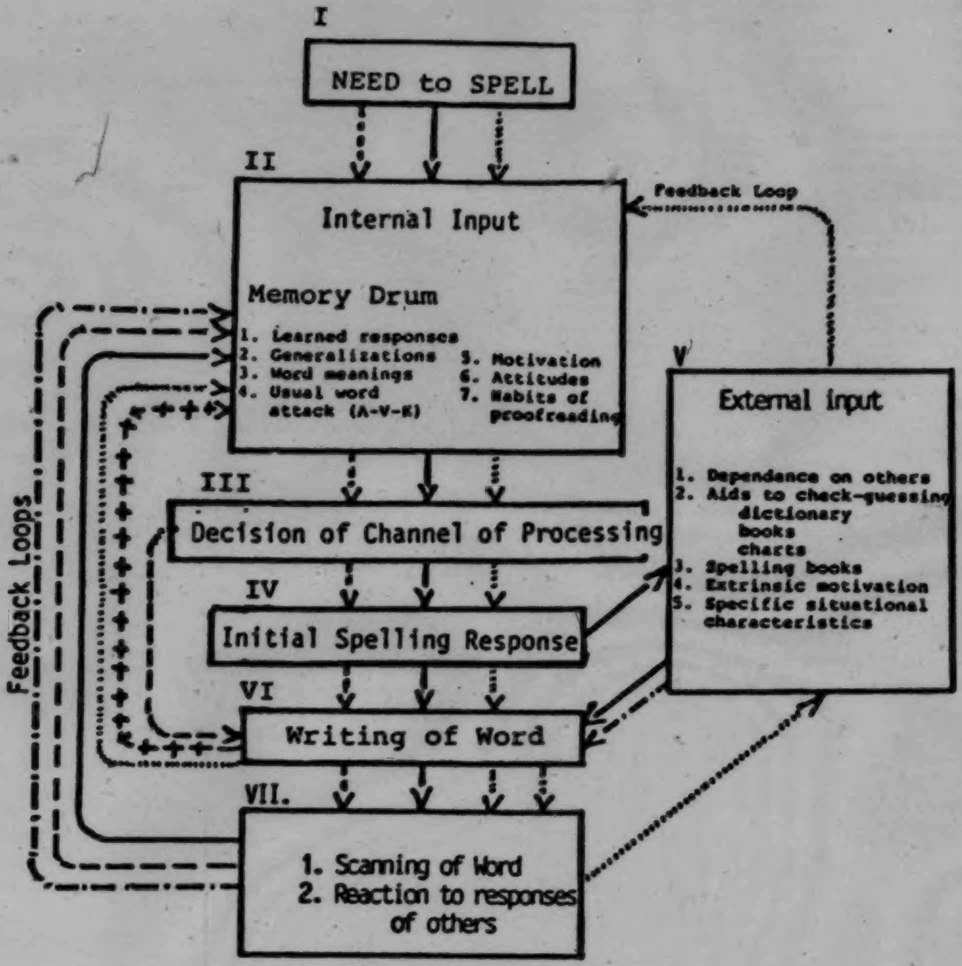
The Personke-Yee Model Of Spelling Behavior

This model of spelling behavior is derived from the perception of spelling as an act of cognition, requiring the use of the information-processing systems in a multi-channel approach (Personke-Yee, 1966). The model indicates how a student processes the spelling information which he or she already possesses, as well as acquires and accommodates new information. Information is provided to the student by three systems: internal, external and feedback.

The basic assumption of the model is that all behavior is initiated by the need to spell a word. The development of a spelling action proceeds from the need to spell a word to the use of a specific spelling strategies. The processing of input--through the phases of: need to spell, processing of information for possible strategies and a decision for action concerning the selection of the proper channel for spelling--is followed by the output production of the needed word. The possibilities for action varies, due to the presence or absence of several channels or patterns of behavior that are available for output. The selection of the proper channel is dependent upon the requirements of the speller for the completion of the spelling act. The spelling of a familiar word requires use of different sources of input and selection of different channels for output than is needed for the spelling of an unfamiliar word. A familiar word utilizes internal input to produce a needed response, while an unfamiliar word requires additional information from external input references.

The spelling of a familiar word, through the use of internal input, involved three major channels, either singly or complementing each other. These include the memory channels, checking channels and the feedback channels of proofread and proofread-rewrite (see Figure III.1).

The spelling of a familiar word allows the student to employ the information that was already present in memory storage. Therefore, the utilization of the internal input requires a search of the stored information and responses in the memory channel for all the internalized spelling habits known to the speller. The memory drum is the storage area for all retained knowledge and the reception area for new incoming information. The components of the memory channel include generalized phonological rules, personal mode for


I
NEED to SPELL
II
Internal Input
Memory Drum
1. Learned responses
2. Generalizations
3. Word meanings
4. Usual word attack (A-V-K)
5. Motivation
6. Attitudes
7. Habits of proofreading
Feedback Loop
External input
1. Dependance on others
2. Aids to check-guessing
dictionary
books
charts
3. Spelling books
4. Extrinsic motivation
5. Specific situational characteristics
III
Decision of Channel of Processing
IV
Initial Spelling Response
VI
Writing of Word
VII.
1. Scanning of Word
2. Reaction to responses of others
Feedback Loops

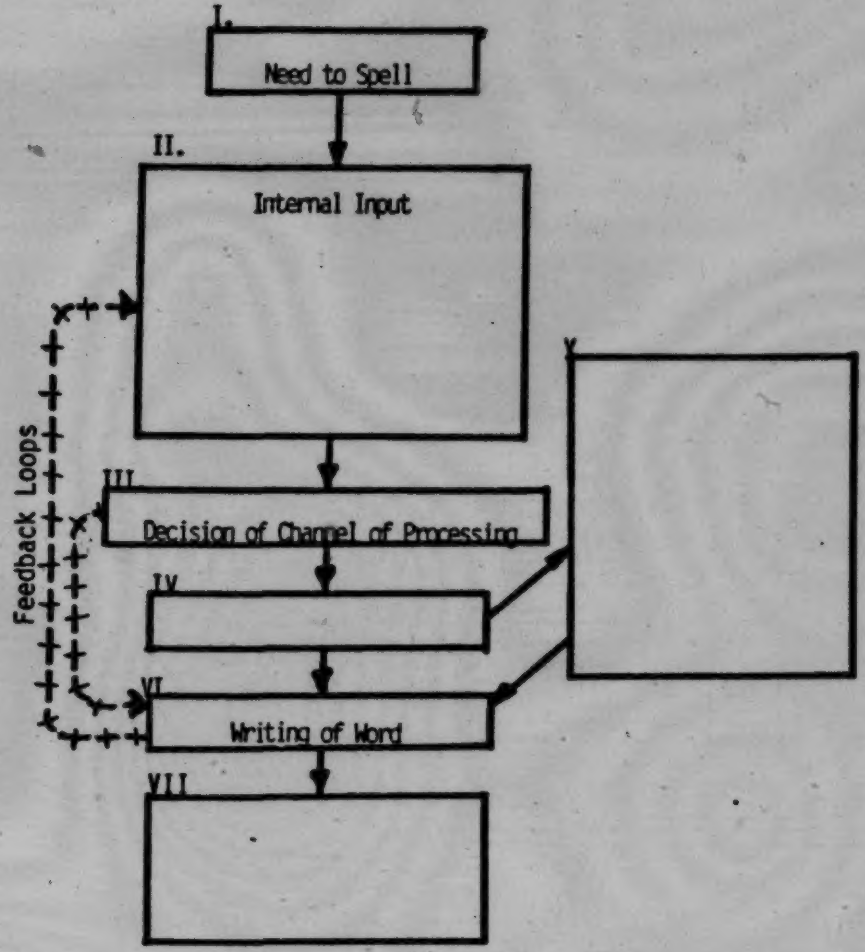
1. (----) Memory Channel (M)
2. (++++) Kinesthetic Detour (Mk)
3. (——) Check Channel (C)
4. (....) Proofread Channel (P)
5. (- -) Proofread-Rewrite Detour (Pr)

Figure III.1
Theoretical Model Of Spelling Behavior
(Source: Adapted From Personke-Yee, 1966)

word attack (auditory, kinesthetic or visual), vocabulary understanding (particularly homonym meanings), and proofreading skills that would aid in the spelling of the needed word (see Figure III.1). When sufficient information is available in the memory drum, then one of two memory channels provide the necessary knowledge for completion of the spelling act.

The memory channel, as utilized by the memory-kinesthetic detour, is employed when the familiar word is automatically spelled by instantaneous recall (see Figure III.2). The development of instantaneous recall is visibly displayed by the continuous output of written words, with no hesitations to scan for correctness of spelling.

If the memory of the familiar word is not instantaneous, the application of the internal input could still result in its production if the knowledge base and responses of the memory drum are adequate. Use of learned generalization or favorite word-attack methods present in the memory drum could produce the needed word. After the initial spelling response is executed, the student then checks the response for correctness, thereby supplying feedback reinforcement through the feedback loop to the memory drum. However, this proofing procedure do not guarantee an accurate spelling, as an incorrect response could remain undetected by scanning of the word through sole use of internal input.


I.
Need to Spell
II.
Internal Input
III
Decision of Channel of Processing
IV
V
VI
Writing of Word
VII
Feedback Loops

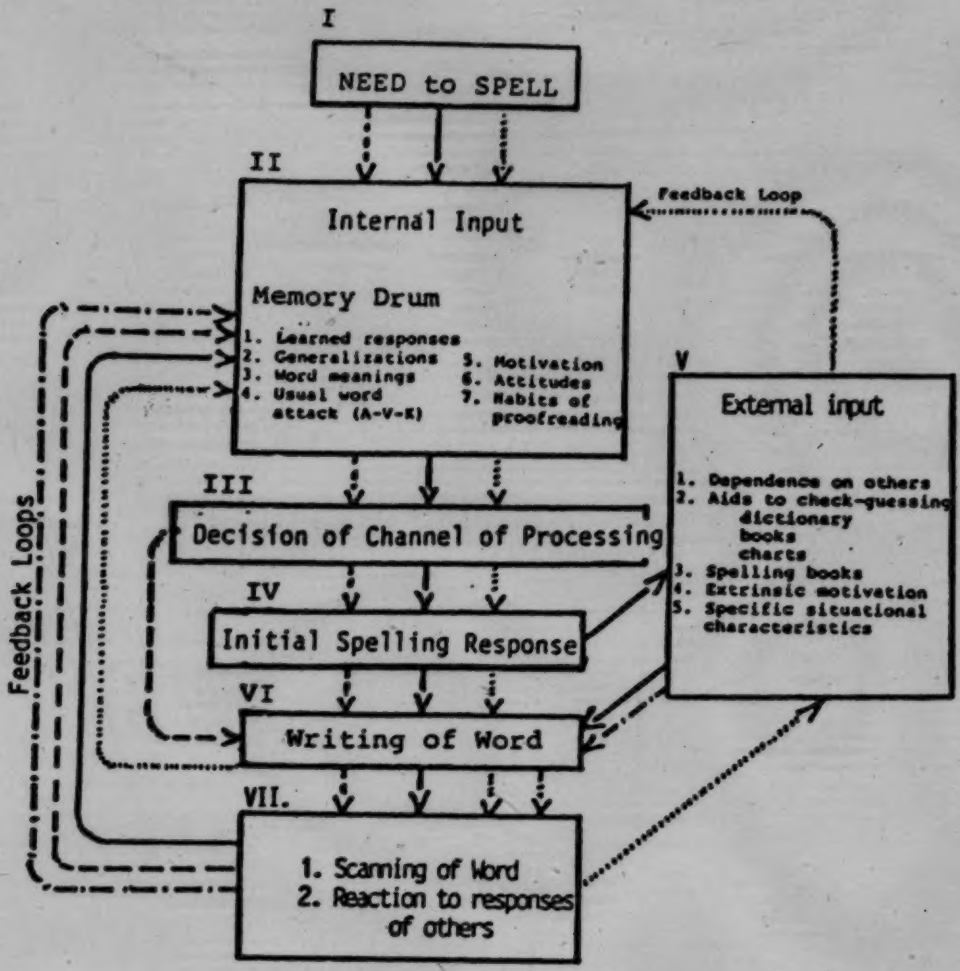
(±±±) Kinesthetic Detour

Figure III.2
Kinesthetic Detour Channel
(Source: Adapted From Personke And Yee, 1966)

If the word is unfamiliar to the speller, then new information has to be sought to produce the needed response. When a search of the knowledge base and memory drum, through the information and decision phases of processing, has proved these sources to be inadequate to provide an initial spelling response, an external source of information is employed. The source of the input is dependent upon the specific situational characteristics and the intrinsic or extrinsic motivation provided by other persons. The external source could be a reference person such as a teacher or a classmate, or a spelling text, a dictionary, etc. The information from external input is processed through any of three remaining feedback channels or patterns of spelling behavior including the checking, proofread and proofread-rewrite channels.

The processing of information through the use of the feedback systems of checking, proofread and proofread-rewrite channels also provide new information for the memory drum. These three channels are considered to be learning channels, which dealt primarily with difficult and unfamiliar words, even though they are utilized to proof the spelling of a familiar word which has required conscious employment of internal input (see Figure III.3).

Employment of external input could involve the utilization of the checking channel when the student has made an initial oral or mental guess of the spelling of the required word, then felt the need to check his or her recall


I
NEED to SPELL
II
Internal Input
Memory Drum
1. Learned responses
2. Generalizations
3. Word meanings
4. Usual word attack (A-V-K)
5. Motivation
6. Attitudes
7. Habits of proofreading
Feedback Loop
V
External input
1. Dependence on others
2. Aids to check-guessing
dictionary
books
charts
3. Spelling books
4. Extrinsic motivation
5. Specific situational characteristics
Feedback Loops
III
Decision of Channel of Processing
IV
Initial Spelling Response
VI
Writing of Word
VII.
1. Scanning of Word
2. Reaction to responses of others

(----) Memory Channel (M)

(——) Check Channel (C)
(....) Proofread Channel (P)
(- -) Proofread-Rewrite Detour (Pr)

Figure III.3
Spelling Behavior Involving
The Use Of External Input
(Source: Adapted From Personke And Yee, 1966)

against an external source of input before actually writing the word. In using the checking pattern of behavior, the first writing of the word is always correct because the speller has referred to an external source for spelling accuracy before making the written response. Feedback on correctness is included in the internal input of the memory drum by the feedback loops.

Use of external input could also involve the application of the proofreading-rewrite detour. The proofreading-rewrite detour becomes involved in the processing when an error is made in the spelling output-response and the speller requires an external source to correct his error and rewrite the word accurately. Scanning of the corrected form provides feedback reinforcement for the proofreading-rewrite behaviors and the store of internal input for the memory drum.

The employment of the feedback channels, either singly or in complementary fashion, including the check, proofreading or proofreading-rewrite channels necessitates conscious involvement in the spelling act. This conscious involvement diverts the thoughts of the speller from the intent of his message to the conscious spelling of the needed response. This results in a conceptual break in the speller's train of thought, which is undesirable to the achievement of free-flowing composition.

Due to the presence of the feedback channels, the utilization of an external source for the initial spelling of an unfamiliar word might not be required again, if the same word is needed in another situation. Spelling of the required response may have been solved by use of internal input upon the second occurrence. The word could have been incorporated into the memory channel by means of one of the feedback channels. Use of the feedback channels changes a new experience into the learned retention of the needed word, if the application of the channels is effective.

The goal of mature spelling behavior is to achieve instantaneous recall, using the kinesthetic bypass, for the majority of spelling needs. If spelling instruction and personal study methods are efficient, this goal could be achieved. However, for spelling instruction to be efficient, the instructor requires a model of the totality of spelling behavior. The Personke-Yee model of spelling behavior is perceived by researchers as not yet totally efficient but possessing both strengths and weaknesses.

Research Relevant To The Personke-Yee Model Of Spelling Behavior

Specific research on the Personke-Yee model of spelling behavior is meager. Relevent research includes a review of the model, plus some limited investigation on the check-guess approach to spelling and the proofreading concepts as developed in the model.

The Personke-Yee model of spelling behavior was reviewed in 1971 by G. S. Westerman (Wallace and Larsen, 1979). Westerman observed that each of the processing and output channels, including the memory channel, memory-kinesthetic detour, checking channel, the proofreading channel and the proofreading-rewrite detour had its own strengths and weaknesses.

The memory channel had its strength in the fact that the forthcoming responses were probably accurate, due to careful processing of learned information. However, its limitations involved the requirement for conscious thought which created conceptual breaks in the writing process, as the mental delving for information took place.

The memory-kinesthetic detour or by-pass was efficient and had its strength in the instantaneous provision of the needed word, without conscious thought. Westerman considered this type of instantaneous reaction to be a requirement for the development of automatic and efficient spelling skills. However, the memory kinesthetic-detour or by-pass had its weakness in the restriction of its use for stored words, whose spelling could have been stored either correctly or incorrectly. Thus, use of this channel lead to problems of negative practice where the speller automatically retrieved an incorrect image and proceeded to strengthens that image by its use.

Use of the checking channel had its strength in the fact that the writer always produced a correctly-spelled word, due to the referral to an external source for a check on the correctness of the guess-spelling which takes place before the actual writing of the word. Therefore, only a correct image was stored in the memory banks. However, this requirement for the employment of an external reference source before the actual writing of the needed word was also a disadvantage. The use of the external source resulted in the greatest conceptual break in thought patterns due to the time involved in obtaining the necessary information.

Westerman observed that when the use of the proofreading channel and/or the proofreading-rewrite detour was implemented, its source of strength was the minimum conceptual break, complemented by the possibility of more active problem-solving behaviors on the part of the speller, as these channels required the speller to use his own resources first before seeking aid from external sources. The disadvantage of these channels was that an incorrect image could be produced that was not easily eradicated even though eventual correction of the response did take place. However, Westerman noted that this problem could be eliminated by the self-requirement on the part of the speller to check his work before assuming that his first memory response of the word was correct.

The only specific research based on the Personke-Yee theory involved an investigation into two particular concepts contained within the model. Personke and Knight (1967) conducted a study on the effects of proofreading and the best-guess approach to spelling achievement. The experimental group was instructed in the use of spelling aids, including the dictionary and wall charts which presented the graphemes for the most common regular and irregular sounds. The experimental group also received practice in proofreading both compositions and word lists for spelling errors in which alternate grapheme choices were required. The procedure of having the experimental students write their best guess of the needed words, based upon the information charts of common spellings of English sounds was followed. The control group received equal opportunity for writing and dictionary practice. Both the experimental and the control groups then wrote a composition, in which the experimental group followed the best-guess procedure for solving an immediate spelling need. The first draft was then proofread by the students for spelling errors. In the edited draft, it was found that the students of the experimental group used more words with greater word variety, in less time, with approximately fifty percent fewer errors than did the control group.

It is obvious that much more research is needed to test the significance of the Personke-Yee model of spelling behavior. However, the model incorporates many facets of spelling behavior which are generally accepted by other investigators as being relevent to spelling achievement.

In summary, the Personke-Yee model of spelling behavior is based on the perception of spelling as an act of cognition which requires the use of information processing, in a multi-channel multi-modality approach, to produce a needed word. The processing involves the use of five phases in the word production, with the first three phases always occurring in the same order. These three phases involve the determination of a problem, a search for appropriate strategies for the problem-solving and the decision of which channels or patterns of behavior to utilize in the written response. The output or response channels are complementary and choice of a channel is dependent upon the specific situational factor of the requirement for the production of a familiar or unfamiliar word. The need for a familiar word allows use of the internal input for problem solution. A familiar word can be written instantaneously or by conscious use of the memory drum. The need for an unfamiliar word requires aid from an external source in order to achieve a written word response.

When an initial word response is produced, it is always scanned for correctness. Three feedback channels of patterns or behavior which are considered to be learning channels are involved in the determination of the correctness of the spelling guess. The checking channel is used prior to the actual writing of the word, while the proofreading channel is utilized in scanning the written word. However, the proofread-rewrite channel is involved in error correction. All three channels provide feedback to the memory drum and increase internal input, so that a word which requires the use of external input to achieve correct spelling on the first occasion of its production, could be part of the learned information in the internal input on the second occasion the word is required.

The goal of the mature speller is instantaneous writing, by the use of the memory kinesthetic-detour. Instantaneous spelling allows the writer to attend to the intent of his message without incurring a conceptual break in the flow of the ideas by the necessity to consciously seek the spelling of a needed word.

While research is meager on the utilization of the Personke-Yee model, the fact that the model incorporates many facets of spelling behaviors that were accepted by other investigators as being relevant to spelling achievement, justifies the use of the model in providing direction for spelling instruction.

Practical Applications To Spelling Instruction As Reflected In This Study

Personke and Yee (1976) note that three systems within the model are of particular importance to the achievement of spelling efficiency: the internal input, the external input and the feedback systems.

Use of internal input by the student requires the internalized presence of a large selection of learned responses. The best approach for learning new word list spelling vocabulary to function as automatic responses is by use of the corrected test, as recommended by both Horn (1960) and Personke (1976). In this approach, the pupil corrects his own test and then rewrites immediately the accurate form of any misspelled words. The rewriting of the word lessens the chance of negative feedback and an incorrect image remaining in memory storage. For students with low spelling efficiency, over-learning of problem words is necessary, through use of word lists and in written context to allow the transfer of the isolated spelling skills to general writing.

The internal input also needs a store of learned generalizations to assist in the spelling of familiar words which can not be produced instantaneously or in the production of unknown words. Personke recommends that inductive teaching strategies should be used, as these strategies require more direct involvement by the student in the learning situation.

Successful use of internal input also necessitates the learning of spelling vocabulary through utilization of more than one method of word attack, as a single approach is not efficient for all spelling situations. Some words can be produced by use of phonology or morphology. Other words require rote memorization and visualization skills. The spelling program needs to encourage use of a combination of approaches. Personke and Yee observe that most spellers used only one modality for word attack, to the exclusion of the other forms and modalities. In this current study, the multi-channel instructional method utilized the VAKT approach for word study and taught the list words by employing a combination of the visual, auditory, kinesthetic and tactile modalities. The spelling words were pronounced and written or traced first as whole words, then in letter sequence and/or in syllables. To aid proper pronunciation, the placement of accents was determined by the student choosing the correct pronunciation from a minimum of two or more alternate ones presented orally. Any appropriate generalizations in relation to silent letters, vowel combinations or rules for adding affixes were also taught.

The internal input of the Personke-Yee model also requires an effective store of word meanings, with particular emphasis on homonyms. This concept is based on the premise that a speller has no need to spell words for which he lacks vocabulary knowledge. Therefore, an effective spelling program should involve techniques for vocabulary expansion. The multi-channel multi-modality instructional method employed in this current study developed word meaning in several ways. First, morphological information was used, as the meaning of the root word was established. Then the effect of adding prefixes, suffixes or *'s'* to the base word was discussed. Semantic meaning was further developed by using each base and derived word in oral sentence context, followed by written sentence context. An example of sentence context containing the spelling word was first provided by the teacher, followed by several oral examples by the student. Dramatics were also used to illustrate word meaning, where appropriate, and verb tense was discussed in terms of future, present and past.

A fundamental component to the efficient use of internal input in the Personke-Yee theory is the motivation, attitudes and spelling habits of the student. For a spelling method to be effective, it is essential that the student possess a high degree of motivation and perceive the necessity for the achievement of spelling competence in the words being taught. If an instructional method destroys motivation or creates an attitude that the achievement of efficient spelling required too much effort, then the method should not be used, even if short term spelling gains are evident. In this present study, to keep motivation high, a variety of instructional and manipulative strategies were employed. Sometimes the word was traced in the air, traced on the skin, written on the desk model or on the board. Basically, the teacher provided the model for word reproduction; occasionally, a student acted as the instructor. In developing word meaning, motivation was provided by having the student illustrate meaning by use of body movement, where appropriate. Another motivator was the graphing of pre-test and post-test results. Social reinforcement was employed throughout the instruction.

The second essential system in the Personke-Yee model of spelling behavior is the external input. The external input is used to extend the current skills in the memory storage and to provide new information for internal input. Therefore, use of dictionary skills and reference persons to check the accuracy of the best-guess spelling responses are considered essential and were utilized in this current study. In the multi-channel multi-modality method of the present study, the student was allowed to ask the teacher or other classmates for a needed spelling required for sentence context, after the student had employed the best-guess method in the original production of the word. For the spelling of list words, the desk model of the word list was the reference source for the speller. When a question concerned the correct grammatical form for sentence context, the teacher acted as the reference source.

An essential component of external input of the Personke-Yee model is the extrinsic motivation provided by other persons, who in turn motivate and reinforce the spelling behavior by encouragement of the actions of the speller.

The third essential system of the Personke-Yee model is the feedback system. Personke and Yee note that feedback concerning the correctness of the student's work, both in spelling tests and in sentence context, should be positive and immediate. Self-correction of spelling tests is considered highly important as a source of feedback for the student on his spelling progress. In the current investigation, four sources of feedback were provided. Feedback was available through the self-correction of word list pre-tests. In both the pre-test and the post-test, the requirement for the student to rewrite correctly the misspelled words was another source of feedback. Additionally, feedback was provided through proofreading time that was given prior to the marking of the spelling tests to allow scanning for unnecessary errors, such as failure to add an affix or the omission of letters, *etc*. With regard to written work, the student was encouraged to provide self-feedback, by proofreading his work for errors of spelling, punctuation and grammar before its final submission. Feedback for grammatical errors in written work was supplied by the teacher who discussed the errors with the student concerned. Personke and Yee considered the development of proofreading abilities and the feedback they provided as essential to the successful transfer of the list-word skills to general written work.

D. Chapter Summary

Several models of spelling behavior have been postulated in an attempt to clarify the cognitive and academic requirements for successful orthography. Most models commonly utilize an information-processing system as their basis for operation, but vary in their concepts of specific abilities and information input required for competent spelling. General categories of necessary information-input included the components of linguistic knowledge and visual skills, plus the generalization and internalization of language rules. However, by the common agreement on the necessity of incorporating a number of processes in the spelling act, all the theories indirectly supported the need for multi-channel multi-modality instruction in spelling.

In recommending a theory of spelling which encompassed the totality of spelling behavior, the Personke-Yee model was recognized by Wallace and Larsen (1979) as one of the most complete models yet formulated. The Personke-Yee model, based on the information-processing system, provided information to the student by three systems of input: internal, external and feedback. The familiarity of a needed word determined which channel would be used in processing the word. A familiar word was instantly produced by the memory channel; an unfamiliar word was processed through the checking or proofreading channels by use of external input. The utilization of a checking or proofreading channel provided further feedback for the memory drum.

The Personke-Yee model, as incorporated into a multi-channel multi-modality instructional spelling approach, was utilized in the current investigation. The weekly word list was taught by a VAKT approach, with meaning developed by use of definitions and sentence context. Proofreading was encouraged in all written work. Motivation was furnished by use of all modalities in learning word lists, by oral participation by both students and the teacher as instructors, by use of self-correction in the pre-test, by graphing of test results and social reinforcement.

Personke and Yee (1969) noted that the multi-channel multi-modality approach to instruction and learning in spelling would always be required as a part of the total spelling behavior, as

> ...no individual was capable of memorizing all the words, nor any single channel was adequate for learning all the words that he would need for his written communication. (p. 345).

IV. CRITICAL ABILITIES IN SPELLING PERFORMANCE

A. Introduction

The attainment of spelling competency cannot be reduced to the simplistic dichotomy of providing instruction through a whole-word *versus* a generalization or phonological approach. The written code necessitates that the speller be efficient in varied support skills. These critical abilities include the need for competence in linguistics, and in the skills of visual and auditory perception (Hodges, 1965; Horn, 1969; Markoff, 1979; Wallace and Larsen, 1979). A review of these abilities is presented in this chapter.

Thus the review of the critical skills in spelling is conducted under the following headings:

1. Linguistic Skills
2. Visual Perception
3. Auditory Perception

B. Linguistics

Spelling competency is heavily related to competency in linguistic skills. Hanna, Hodges and Hanna (1966) noted that when a child discovers the linguistic principles which govern speech, his spelling vocabulary will expand almost to the degree of his spoken vocabulary. Linguistics involves the study of a language. The possession of linguistic competence requires that the speaker be knowledgeable in the rules for generating and understanding the conventions employed in the content, form, and use of the language. Effective linguistic comprehension requires efficiency in the component skills of phonology, morphology, syntax, and semantics (Kean and Personke, 1976).

Phonology

The phonology component within the linguistic skills is concerned with the sound structure of our language. The basic unit of sound in phonology is the phoneme. Hammill and Bartel (1975) defined a phoneme as a single speech sound, and the grapheme as the various letters or groups of letters that could represent this sound. As an example, the */k/* phoneme would be represented by the grapheme *k*, *c*, or *ck*. The debate on the relationship between the efficiency in phonological skills and the use of generalizations to further spelling competence has been examined previously in depth under the topic *Regularity Versus Irregularity in Orthography* in Chapter 2. However, even Thomas Horn (1960), who was a strong defender of the whole-word visual-haptic approach to spelling instruction conceded that some kind and amount of phonetic instruction could be beneficial to the achievement of spelling efficiency. Another skill that is relevant to both linguistic and spelling competence is morphological knowledge.

Morphology

Hammill, Larsen and McNutt (1977) defined morphology as the study of the arrangement and the interrelationship of the meaningful units of speech, known as morphemes. The morphemes are considered to the the smallest meaningful unit of language, and are perceived as containing the properties or potential for building words or altering their meanings. Relative to spelling, morphological knowledge has been associated with increasing spelling achievement, the general transfer of isolated spelling skills, and the furthering of word analysis skills.

Morphemes are divided into two classes: bound morphemes and free morphemes. Wiig and Semel (1980) defined free morphemes as a unit of meaning that can stand alone in utterances and sentences, such as the word *dog*, *friend*, *etc*. Free morphemes are also known as base words, or root words. A bound morpheme on the other hand is considered to be a unit of meaning which cannot occur alone and are joined to a base word. Examples of bound morphemes are inflectional endings, derivational endings, and prefixes. An example of an inflectional ending would be the addition of the affix *'s'* to produce the plural form of many words, and an example of the derivative endings would be the addition of a suffix or suffixes to a base word. Within the category of bound morphemes, the inflectional morphemes reflect grammatical meaning, by their formation of plurals, past tenses, superlatives, *etc*., while the derivational morphemes change the form, class or semantic meaning of the base word by their addition of prefixes and suffixes.

Knowledge of the effect of inflectional and derivative morphemes on spelling and word meaning is also associated with the expansion of the oral and written vocabulary by students, and the furthering of general spelling competency by transferring isolated spelling skills to written composition (Fitzgerald, 1950; Otterman, 1955; Hodges and Rudorf, 1965; Hanna, Hodges and Hanna, 1966; Chomsky, 1970; Nicholson and Schachter, 1979; Wallace and Larsen, 1979; Howell and Kaplan, 1980; Marino, 1981). On the basis of his word-list studies, Fitzgerald suggested that 2,650 words plus their derivative forms composed ninety-five percent of children's written vocabulary in elementary school.

In an experiment, Otterman (1955) was able to substantially increase spelling achievement in poorer spellers of the seventh grade by furthering their knowledge of prefixes and root words.

Hanna, Hodges and Hanna (1966) suggested that morphological knowledge could be useful in spelling phonologically irregular words. However, they noted that more extensive study was needed on the effects of phonology, morphology and semantics and their interrelationships with American-English spelling.

Carol Chomsky (1970) maintained that the presentation of linguistically related word-pairs or derivative forms (example: history/historical) would encourage the speller in use of language cues. Markoff (1976), Zutell (1978), Anderson and Lapp (1979), Donoghue (1979), Nicholson and Schachter (1979), and Templeton, (1979) reinforced Chomsky's position. They stated that knowledge of language relationships was furthered by understanding the development of word derivations. The derivational and inflectional endings acted as an aid to spelling related words and provided language and sound cues that extended spelling vocabulary.

In agreement with Chomsky, Marino (1981) noted that students are aided in the spelling of a needed word by thinking of a related or derivative form of the word. Marino also maintained that calling attention to the interrelatedness of derivative forms of words also furthers the learning of the patterns and structure of the American-English language.

Successful spelling of a word containing morphemes has often been associated in research with the use of word analysis. Howell and Kaplan (1980) noted that the use of word analysis and morphological skills is to simplify the spelling task for good spellers, who use these skills to divide the word into syllables or related word parts of base word and morphemes.

Some earlier research findings however directly oppose the position that efficiency in word analysis and morphological skills can increase spelling achievement. In a study that stressed the teaching of root relationships, similar endings and sound groupings with fifth grade students, Jackson (1953) reported no significant improvement in spelling achievement. Horn (1960)also reported little or no increase in spelling achievement when spelling words were taught in syllabicated form. Cramer (1969) also supported the point of view that children make greater spelling progress through practicing word analysis in reading rather than through direct daily word-analysis instruction in spelling. Another skill that is relevant to linguisitic and spelling competence is semantic knowledge.

Semantics

Wiig and Semel (1980) define semantics as the study of the relationships between words and grammatical forms in a language and their underlying meaning. Educators and researchers generally indicate that a relationship exists between spelling achievement and vocabulary development. Relative to spelling success, efficiency in semantic knowledge, particularly in the area of word meanings, is associated with furthering general writing skills. Expansion of word meanings is perceived as providing the motivation for learning to spell the newly acquired vocabulary as it is needed in written composition.

Hahn (1963) concluded in his doctoral dissertation that the language experience obtained through meaningful writing could be the main contributor to spelling achievement in three groups of second grade children. The first group received two years of intensive phonetic instruction, the second group received *normal* phonetic instruction through their reading program, and the third group received normal phonetic instruction through their reading program, plus an emphasis upon a broad language-arts approach that utilized meaningful writing situations to develop spelling. Results did not indicate a significant difference between any two groups but the third group attained higher mean spelling scores.

Markoff (1976) maintained that spelling ability is highly correlated with the development of vocabulary and word meanings. Therefore, word meanings as well as orthography should be taught during the course of spelling instruction.

Anderson and Lap (1979) indicated the necessity for relating spelling instruction to the understanding of word meanings. They posited that the development of word knowledge and accompanying spelling competency is necessary to expand the writer's ability to describe abstract ideas.

Donoghue (1979) suggested that spelling should be taught with the help of reading to further vocabulary development for both writing and reading purposes. She stated that a language-experience approach to reading produces significantly better spellers than a basal reading approach, both in spelling phonetically regular and irregular words, and in written composition.

Wiig and Semel (1980) also associated success in spelling with development of word knowledge. They noted that the learning-disabled student must thoroughly understand the meaning of a word before he or she will use it in written form. Wiig and Semel maintained that for learning disabled students, definitions should be more concrete, and should contain redundancies such as antonyms, synonyms and other associated words to further vocabulary understanding. Wiig and Semel also favored placing the word in sentence context to develop meaning.

While most investigators support the idea of the necessity of developing word meaning to further spelling achievement, there are some critics of this position. Horn (1969) stated that most of the word meanings in the basic spelling vocabulary from the first to the sixth grade would already be known to the students and used in their written work. Unknown vocabulary would require oral development by the teacher and by the use of the dictionary. Therefore, Horn declared that the arbitrary practice of developing word meanings and use of sentence context is a waste of time. Some research is available on the effectiveness of linguistically-based spelling texts *versus* other basal approaches in producing spelling competency.

A Study Of Three Linguistically-Based Spelling Texts

Hammill, Larsen and McNutt (1977) conducted an evaluation of the effectiveness of three language-based spelling texts on furthering spelling achievement. The study basically tested spelling achievement resulting from the varied spelling approaches current in the spelling basal texts *versus* no formal spelling lessons. A comparison was made of spelling achievement for 2,956 students in twenty-two states from the third to the eighth grade. Three linguistically-based spelling series were utilized in spelling instruction for approximately fifty-seven percent of the sample, while twenty-nine percent of the sample followed other spelling programs and thirteen percent of the students received no spelling instruction.

Each of the three linguistic spelling series utilized a different linguistic approach. The *Spell Correctly* (Benthal *et al*, 1974) text presented both basic and enrichment word lists in each spelling unit. Each list was composed of words that illustrated one particular phonological or morphological spelling pattern. *Spell Correctly* also integrated many other language-arts skills, including use of the dictionary.

The *Word Book* (Rogers, Ort and Serra, 1970) series grouped words according to spelling patterns, and vowel-changing patterns (example: pat, pet, put). The vocabulary was considered to be composed of eighty percent of the written vocabulary needed by elementary children while the seventh and eighth grade vocabulary was based on words important to adult writing. Communication skills, including speaking and listening, were emphasized by the text authors.

Basic Goals in Spelling (Kottmeyer *et al*, 1955) also followed the approach of basic and enrichment word lists for each unit. Basic words were related to frequency-of-usage research. Phonological (sound-symbol) and morphological relationships were stressed,regarding the similarities in the sounds and spelling of words, with the deductive generalizations by students.

The tabulation of spelling achievement scores produced a number of findings. In the third and fourth grade, children who received systematic spelling instruction scored higher than those who received no instruction. At these grade levels, the spelling program followed by *Spell Correctly* was least effective, while the others were about equal in effectiveness. At the fifth and sixth grade level, *Basic Goals in Spelling* was least effective. No instruction, at this level, yielded the best results. At the seventh and eighth grade level, *Word Book* and *Spell Correctly* produced the best spelling achievement.

In considering the practical implications of the results, the investigators noted that the actual difference between two mean scores, when comparing achievement based on any two approaches, was only one or two words spelled correctly on the *Test of Written Spelling*. The investigators also stated that no spelling instruction after the fourth grade was almost as effective as spelling instruction. However, this result could have been biased by the small number of children (100) in the third, fourth, fifth and sixth grades that received no spelling instruction.

Summary

Investigators generally agree that the acquisition of linguistic knowledge by the student will increase both spelling competence, expand spelling vocabulary and further writing skills. Necessary linguistic knowledge to further spelling ability includes the skill components of phonology, morphology and semantics. All investigators maintain that at least some phonological and generalization knowledge will aid spelling progress. Understanding of morphological relationships, especially those involving bound morphemes, generally is considered to be of particular importance to spelling achievement. Semantics, and the development of word meaning not only provides the student with a greater vocabulary to describe more abstract ideas, but also creates the need to learn to spell the new words so they can be used in written composition.

The next area of critical skill development to be examined is that of visual perception.

C. Visual Perception

Relative to spelling, visual perception involves the ability to perceive, organize and interpret the visual detail of the word, including the formation and sequencing of the letters. Peters (1975) posited that good visual perception skills are primary to spelling success, as vision is the preferred sense for spelling production and learning. Visual perception is composed of several skills. The component skills of visual discrimination, association, memory and imagery shall be reviewed, relative to their effect on the achievement of spelling competency.

Visual Discrimination

Visual discrimination involves the ability to identify similarities and differences in letters or words (Lerner, 1981). The presence of good visual discrimination skills has been found to be related to spelling achievement. Russell (1955) concluded that both visual and auditory discrimination were closely related to spelling success from the second to the sixth grades. Newton (1961), in a Calgary study of language-arts abilities which contributed to spelling achievement, found that visual discrimination represented 4.37 percent and visual memory 6.54 percent of the 70.51 percent of the variance in language-arts abilities relative to spelling. Newton noted in the educational implications of her study that specific practice is needed by students in identifying words which share similar forms but different meanings, as well as practice in visual memory to aid students in remembering the spelling of the words.

Kaufman and Biren (1976-1977) found a correlation between spatial errors, as indicated by persistent reversal problems, and poor spelling achievement and writing. The investigators concluded that children who exhibited an excessive or high percentage of spatial errors were poor spellers, while children who produced few spatial errors attained good spelling achievement. Mann, Suiter and McClung (1979) also related inadequate visual discrimination abilities to low spelling achievement. A second skill component of visual association is also considered to be a factor relating to spelling success.

Visual Association

Visual association is especially utilized as an aid in spelling phonetically irregular words. It involves the tranferring of the memory of a particular grapheme or letter sequence, used to represent the sound in a number of familiar words, to a new word that contains the irregular sound-symbol relationship.

A number of investigators have determined that competence in visual association is relevant to spelling achievement. Simon and Simon (1973) noted that visual association is a major aid in remembering the graphic forms of phonetically irregular spellings, by the formation of small associative sets of words which contained the same irregular graphic structures, such as the example of *light, sight, right*. It was further noted that visual association serves as a proofreading mechanism that allows the writer to check the form of the word as written against his or her visual memory of other associated words that had a similar form. Simon and Simon maintained that many misspellings were due to a lack of visual information, including direct associations or recognition skills that could assist in the production of the correct written form.

Peters (1975) posited that success with the written language was dependent upon the association of certain letters occurring together. Nicholson (1979), Mann, Suiter and McClung (1979) and Howell and Kaplan (1980) noted that the ability to spell cluster sounds, both regular and irregular, is critical to spelling competence.

Marino (1981), in analyzing children's misspellings, found that good and poor spellers are differentiated by their ability to associate letter groups and the constraints that were to be found in such groups, such as the *mb* in *lamb*. A third component skill of visual memory and imagery is also a factor in spelling success.

Visual Memory And Imagery

Visual memory and imagery involve the ability to recall a mental image of the letters of a word and their sequence. Researchers have linked the skills of visual memory, also known as recall or revisualization, and the ability to use the mental imagery to efficiency in spelling. In recognition of this connection, methods of spelling instruction have also been formulated to develop skills in visual memory and imagery using spelling words.

In studying the relationship of visual imagery to spelling, Radaker (1963) tested the effect of practicing visual imagery of list words upon spelling achievement, with fourth grade children. One group received two sessions of forty-five minutes duration of visual imagery practice with spelling words each week, while the other group received six practice sessions of 45 minutes each. Imagery practice involved trying to mentally visualize the word and hold the image for one minute. The results of the study indicated that the learning and retention of spelling words was equal for both groups. Radaker concluded that visual imagery could be trained in relatively short periods of time, and visual imagery training would maintain spelling performance over a long period of time. Chomsky (1970) reinforced Radaker's position that good spelling skills required the use of visual imagery. He maintained that spelling success relied on an underlying mental picture of the word. Simon and Simon (1973) noted that the use of the generate-and-test procedure for spelling a needed word was dependent upon word recognition clues. Word recognition information allows the speller to recognize the correct spelling of a word when it was presented to him or her, which involves retrieval of the correct image from memory storage.

Markoff (1976) maintained that for children with severe memory problems, there must be a reduction in the number of spelling words to be learned in a year. She also stated that several other factors needed to be controlled for students with visual memory deficits, including: the number of letters in each word, the number of words taught per day and per week, and the necessity for over-learning of misspelled words before proceeding to a new lesson. Markoff noted that for children with a visual memory deficit, learning of spelling words is aided by use of tracing and/or kinesthetics.

Tovey (1978), in studying the relationship of the effect of visual memory on spelling achievement, posited that good spellers did not try to match sounds to symbols. Good spellers used their memory of visual sequences or letter combinations as a spelling strategy. Tovey maintained that the spelling task should be thought of in visual terms rather than in sounds.

Mann, Suiter and McClung (1979), Groff (1979), Wallace and Larsen (1979), and Howell and Kaplan (1980) also took the position that good visual memory or recall skills were basic to spelling success.

Lerner (1981) further reinforced the concept of the necessity for good visual memory skills in the production of spelling competency. Lerner posited that poor spelling resulted from the inability to visualize the letters of a word and their sequential order. She also noted that many of the successful spelling techniques, such as the Fernald tracing technique, involve strengthening visual sequential memory.

The use of visual imagery has also been perceived as a remedial approach for phonetically deficient spellers, by Forrest (1981). Forrest maintained that visual imagery is a more primitive biological function than written language, and therefore has greater potential as a means of circumventing problems of written language than did phonemic decoding. The necessity for the use of visual imagery in learning spelling vocabulary has been incorporated into two specific instructional methodologies: the corrected test approach and the imitation or modelling approach.

The importance of developing and retaining only the correct visual image of the spelling vocabulary was emphasized by Ernest Horn (1947) in his instructional approach called the corrected test. Horn considered the self-marking of spelling tests and correction of any misspellings, as required by this instructional method, to be the most important factor in the learning of spelling vocabulary. Other investigators have confirmed Horn's view of the corrected test, including Kean and Personke (1976), Hillerich (1977), and Langford and Quorn (1981).

The necessity to create the correct mental image of a needed word has resulted in a second instructional approach to spelling known as imitation or modelling. In this method, the learner follows and reproduces the visual example of the letter sequence of the needed word as provided by the instructor.

Some research has been carried out on the effectiveness of mental imagery as a specific instructional approach. In a study utilizing imitation training to Stowitschek and Jobes (1975), eight learning-disabled children were able to retain 80 percent of the spelling words taught, and one child retained all of the spelling words. The effectiveness of mental imagery as a specific instructional approach was also studied by Caban (1978). In a study of 150 eighth grade students, the effects of three instructional spelling approaches on spelling achievement were compared. It was hypothesized that spelling words would be better learned and retained by using mental imagery *versus* a word drill or individual study approach. In post- and delayed post-test administration, the group using the imagery approach scored somewhat higher than the other two groups, but all treatments made a difference to spelling retention.

Summary

Investigators agree that the acquisition of efficient visual perception skills is primary to spelling success. The component skills of visual perception that are highly related to spelling competence include: visual memory, discrimination, association and imagery. All investigators agree that it is necessary to be able to differentiate the formation of letters, and to be able to remember their sequence of presentation in the spelling of a word. Use of visual association and imagery are considered to be necessary tools for remembering the correct letter sequence of a word. The next area of critical spelling skill development to be examined is auditory perception.

D. Auditory Perception

Relative to spelling, auditory perception involves the ability to perceive, interpret, and organize the auditory details of the word, including the discrimination of the separate sounds within the word, and the memory for the number of sounds and the sequencing of the sounds for reproduction of the word. Two critical auditory perceptual skills related to spelling are auditory discrimination and auditory memory.

Auditory Discrimination

Auditory discrimination involves the ability to identify the similarities and differences in individual phonemes or clusters of sounds within a needed word. According to several investigators, significant differences existed in the auditory discrimination abilities of good and poor spellers. Durrell (1964), in a study on factors affecting beginning reading, concluded that imperceptions in the comprehension of the sounds contained in the spoken word gave little possibility of efficiency in reading or spelling, regardless of methodology.

Markoff (1976) noted that three modalities are involved in spelling, including the visual, auditory and kinesthetic.

Of the component skills within these modalities, Markoff considered discrimination to be the most important perceptual skill. Markoff also posited that auditory memory and correct sound sequentialization were partly dependent on the success of the initial discriminations.

Mann, Suiter and McClung (1979), and Howell and Kaplan (1980) also posited that good auditory discrimination was a prerequisite for spelling success. Howell and Kaplan noted that good spellers have better auditory discrimination and phonetic abilities than students experiencing spelling difficulties.

Some investigators maintain that a relationship exists between poor auditory discrimination, defects in articulation and spelling achievement. Cohen and Dichl (1963) concluded that a difference in auditory discrimination did exist between articulatory-defective and nonarticulatory-defective persons. Boyd and Talbot (1971), Markoff (1976), Turnbull and Schultz (1979), Wallace and Larsen (1979) and Mann, Suiter and McClung (1979) reinforced the position that exact pronunciation, resulting from good auditory discrimination skills, is an important factor in learning to spell.

However, not all investigators agreed on the effect of articulation errors, resulting from poor auditory discrimination, on spelling achievement. Groff (1979) stated that there is little relationship between articulation errors in children's speech and their faults in spelling.

Auditory Memory

Auditory memory, relative to spelling, involves the ability to recall the sounds of phonemes of a word, their order of presentation and being able to relate the needed sounds to the appropriate letters or graphemes.

Markoff (1976) noted that an auditory memory problem is usually indicated when the letters of the word, as written by the child, bear little resemblance to the sound patterns present in the word. Markoff also posited that the ability to identify the position of a sound in a word is a skill that is basic to good spelling. The speller must be able to determine the position of the sounds, remember this position, and be able to relate the sounds of a specific position to the letters or graphemes that represent them.

Donoghue (1979) indicated that in order for a child to spell, he must be able to auditorially analyze the word into its ordered component parts. This is a reinforcement of Markoff's position. Donoghue also considered auditory gross memory and auditory sequential memory of the order of the sounds in a word to be essential to spelling success.

Mann, Suiter and McClung (1979) also maintained that auditory memory sequencing was one of the most crucial skills in the achievement of spelling competency. A deficiency in this skill was considered to be a major contributing factor in the problems of low-achieving spellers. A poor auditory memory was perceived as preventing the student from utilizing phonology successfully as a spelling aid.

Howell and Kaplan (1980) stated that the ability to recall the phoneme-grapheme correspondences or the sound-symbol relationships was an obvious prerequisite to spelling. Howell and Kaplan maintained that when a word is being analyzed phonetically to simplify the task of auditory memory, the word should be decoded in terms of letter clusters instead of individual letters.

McLeod and Greenough (1980) conducted a study to determine the relationship of short term memory, both gross and sequential, to spelling achievement in one hundred good and poor spellers, from first to the fourth grade. Specifically, the investigators wanted to determine if superiority in immediate memory was a facet of the greater sequencing ability present in good spellers. The results indicated that a significant difference existed for immediate gross memory, as related to spoken words, printed letters and digits, in favor of the good speller at the fourth grade level. When redundant materials were used, the good spellers showed superiority in their abilities for grouping or chunking redundancies in written and spoken language. This grouping or chunking capability of good spellers reduced the memory load and allowed them to develop superior spelling. However, McLeod and Greenough concluded that no specific or significant differences were present between good and poor spellers in their ability to order their tasks by the use of sequential memory, but poor spellers were inferior on gross memory tasks. If poor spellers only had a memory capability for remembering four items, they could not be expected to sequence five items.

Summary

Investigators agree that the acquisition of efficient auditory skills is primary to spelling success. The component skills of auditory perception that are highly related to spelling competence include auditory discrimination and auditory memory. All investigators agree that the ability to discriminate the different sound components within a word, and be able to remember their order of presentation is primary to spelling success. The use of sound cluster groups within a word, as opposed to remembering the order of individual sounds, is recommended to reduce the gross memory task.

V. RATIONALE AND HYPOTHESIS

A. The Problem

Education has always sought more effective ways of teaching American-English orthography. In addition, educators are seeking more efficient modes of remedial instruction. The purpose of this study is to provide some possible alternatives in spelling instruction and remediation for the classroom teacher and to compare spelling achievement resulting from two established modes of classroom instruction with a third approach. These two established modes, the traditional study-test and test-study-test, have been investigated and compared. However, as these two methods still predominate in the spelling instruction in many classrooms, they remain the *status quo* for comparison with a third method. The third method relates to the theory of spelling behaviors as perceived by Personke and Yee (1966), and incorporates a multi-channel multi-modality approach to spelling instruction. As Personke and Yee (1966) theorized spelling behavior, an inter-sensory approach is necessary for efficient transfer of spelling skills.

> No single channel is correct for spelling a particular word each time it is met....This shifting from one channel to another is perhaps the best indication of the complementarity of the channels. (p. 284)

Definition Of The Questions

The major questions raised in this study are as follows:

Question 1

Will the sample subjects receiving multi-channel multi-modality spelling instruction (Experimental Group 2) show significantly greater spelling achievement gains than the subjects receiving the traditional study-test instruction? (Control Group)

Question 2

Will the sample subjects receiving multi-channel multi-modality spelling instruction (Experimental Group 2) show significantly greater spelling achievement gains than the subjects receiving the test-study-test instruction? (Experimental Group 1)

Question 3

Will the sample subjects receiving the test-study-test spelling instruction (Experimental Group 1) show significantly greater spelling achievement gains than the Control Group subjects receiving the traditional study-test method and less gains than those receiving Experimental Group 2 instruction?

Question 4

Compared with Experimental Group 1 and ExperimentalGroup 2, will the Control Group receiving the traditional study-test instruction show the least significant spelling achievement gains?

Questions 1 And 2: Rationale

In learning to produce correct orthography, students strive to attain mastery of a code for translating linguistic patterns to graphemic productions. This code involves learning the probability of certain letters coming together in a particular sequence. Most children who have been talked to and read to at home, develop a fine network of linguistic abilities which easily translate into successful spelling patterns (Peters, 1975). However, the children who are from a less favorable background where there is sparcity of interpersonal communication and books, will frequently have a linguistic deficit. Other children may be unable to intuit the relationship between graphemes and phonemes due to a specific learning problem. Children who are linguistically impaired or have specific learning problems must be directly taught the relationships between oral and written communications, and the codes that allow correct orthography. Peters (1975) states, "The less favored child will initially need to be taught what he has not been fortunate enough to have caught" (p. 109).

Children who are poor spellers need a systematically planned program (Johnson and Myklebust, 1967; Frierson and Barbe, 1967; Otto, McMenemy and Smith, 1973; Peters, 1975). In the last two decades much work has been done to determine the specifics of such a program, including the particular skills required for successful spelling and the methodology for teaching skills. The specific abilities that are needed for successful orthography include auditory and visual discrimination, memorization, sequentialization, analysis and synthesis and simultaneous integration of these skills (Johnson and Myklebust, 1967). In order to acquire this knowledge, Hodges (1966), Otto, McMenemy and Smith (1973) and Howell and Kaplan (1980) recommend a spelling program involving the use of visual, auditory and kinesthetic imagery to learn to spell the word. They advise that the students first learn to read the spelling word. If the word has regular orthography, it should be taught by a syllabication procedure. The students say the word one syllable at a time and write the syllables as a visual clue, then write the word without reference to any visual cues. If the word is non-phonetic, it should be grouped separately from the phonetically regular words. First, the non-phonetic word should be revisualized as a whole, followed by the students having to fill in omitted letters. Over-learning of word lists is advised, as well as distribution of word review. There is variance of opinion concerning development of word meaning by definition as versus sentence context.

Otto, McMenemy and Smith advise development of word meaning by sentence context, while Hillerich (1976) stresses the need for children to learn the definitions of study words. Hillerich states that students will not incorporate the study words into writing if they are uncertain of the word meanings. Pre-tests are recommended by Frierson and Barbe (1967) as motivation and also to serve as the determiners of individual study lists. Hillerich, along with Kean and Personke (1976), advocate that each student mark his or her own pre-test and correct the errors immediately.

All three of the instructional methodologies utilized in this study contain some of these necessary skills and approaches. However, other skills and approaches are restricted to one or two of the three study methodologies. Two methods, the test-study-test and the multi-channel multi-modality, provide some type of pre-test and mastery test. The test-study-test and the multi-channel multi-modality methods also entail students marking their own pre-tests and preparing individual study lists. The multi-channel multi-modality method further requires the students to correct their errors immediately after marking the test. All three methods provide some instruction in word meaning. However, the multi-channel multi-modality approach requires the use of word lists and their derivatives in sentence context, first orally, then in written form, to extend meaning. This sequence of *oral to written* also follows the natural development of language (Smith, 1972).

Both the study-test and test-study-test procedures mainly depend upon the basal spelling text lessons to indirectly teach the skills of auditory and visual discrimination, memorization, sequentialization, analysis and synthesis and simultaneous integration of these skills. These skills represent areas of difficulty for low achievers in spelling. The multi-channel multi-modality procedure provides direct instruction on the skills using a multi-sensory format. In the traditional and test-study-test approaches, the format is mainly one of written exercises with limited oral work. While the students are proceeding through the text exercises, they may or may not be able to read and comprehend all the directions, or attend to the skills presented by the exercises. This is particularly true of poorly motivated spellers, or students who have a short attention span (Frierson and Barbe, 1967). Using the multi-channel multi-modality method, the varied multi-sensory activities aid in keeping the students on task, as well as allow the teacher to directly see that the students are attentive to the lesson. In summary, only the multi-channel multi-modality instructional approach appears to incorporate the totality of specific skill development and methodological philosophy of the reference authors.

Questions 3 And 4:Rationale

The rationale for the superiority of the test-study-test instruction *versus* the study-test method in the production of greater spelling gains is based on the efficient use of the student's time, and the individualization of study word lists. Fitzgerald (1950) noted that the utilization of the test-study-test approach made more efficient use of the student's time by allowing him to focus on individual problems and deficiencies. He also maintained that each student had different spelling problems and use of the test-study-test instruction, through its individual study list, would teach the speller to focus on specific problem areas. Furthermore, Fitzgerald stated that use of the individual study list in the test-study-test approach would motivate the speller to learn all the words on his or her individual spelling list.

In relation to the effectiveness of a word-study approach and use of instructional time, Horn (1969) stated that calling the attention of the total class to the presence of the difficult parts in a word, as utilized by the study-test method, was not as effective as individual study on personal spelling deficits. Horn maintained that directing the attention of the class to hard spots in a word was a waste of time, as the difficult part of the word for each person was relevant to his or her spelling knowledge.

Relative to the production of effective word-study techniques, Hillerich (1977) reinforced Fitzgerald's position that the test-study-test approach allowed each student to identify his or her own areas of difficulty in a word. Hillerich also agreed with Fitzgerald and Horn's position that individuals find different parts of the word difficult.

Johnson, Langford and Quorn (1981) were also supporters of the superiority of the test-study-test method over the study-test approach. They too maintained that the test-study-test instruction utilized the time of the student more effectively. These researchers noted that requiring students to study words that they already knew resulted in a reduction of time for the study of words on which they needed help.

In summary, the test-study-test method of spelling instruction is considered superior to the study-test approach, as it allows the individual to study a spelling word list based on his or her own spelling needs, and thus provided a more efficient utilization of the student's time.

As a result of the review of the relevant spelling literature, the following hypotheses have been generated.

Questions 1, 2, 3 And 4: Hypotheses

Hypothesis 1. Experimental Group 2 receiving multi-channel multi-modality instruction will show significantly greater spelling gains than the Control Group, receiving the study-test instruction.

Hypothesis 2. Experimental Group 2 receiving the multi-channel multi-modality instruction will show significantly greater spelling gains than the Experimental

Group 1, receiving the test-study-test instruction.

Hypothesis 3. Experimental Group 1 receiving the test-study-test instruction will show significantly greater spelling gains than the Control Group but less gain than Experimental Group 2.

Hypothesis 4. The Control Group receiving the study-test instruction will show the least significant spelling gains when compared with Experimental Group 1 or Experimental Group 2.

Statistical Analysis Related To The Hypotheses

1. Descriptive statistics of the sample, including means, standard deviations and graphical analysis.
2. Concerning Hypotheses 1, 2, 3 and 4:
    a. Product moment correlations to the reliability and validity of the spelling measures
    b. One way analysis of variance
    c. Two-way analysis of variance (ANOVA 26) with repeated measures on Factor B (Winer, 1979)

VI. METHODOLOGY

A. Introduction

The methodology for the study is described in detail in this chapter. Information presented includes the procedures for sample selection, a description of the specification of the test instruments used and the procedures for their administration. The chapter also discusses the details of the instructional spelling approaches employed in the study and the relevent aspects of the study design.

Thus the review of the methodology is conducted under the following headings:

1. Sampling
2. Selection Of Sampling
3. Instruments
4. Instructional Approaches
5. Procedure

B. Sampling

The sample subjects were drawn from an elementary school in the County of Lacombe. The school serves a total of 250 to 270 Grade Five and Grade Six students from the surrounding agricultural region and small town of 5,000 population. The students selected for this study were from Grade Five and were drawn from a total of 105 fifth grade pupils, who ranged in chronological age from nine years, five months to twelve years, five months. The cumulative records of the school provided the information for initial screening of the students. Criteria for sample selection were based on chronological age, intelligence quotient, and initial year for subjects in Grade Five. All participating subjects were required to be within plus or minus one year of grade-appropriate age, which is ten years or 120 months. This was to provide closer equalization of psychological development in sample subjects. The subjects included in the study were also required to possess low average to above verbal intellectial abilities, to ensure that all study participants had adequate innate capability for understanding the spelling instruction. Any students repeating Grade Five were eliminated from the study, in order to prevent possible contamination of results due to practice effect in previous use of spelling lessons and word lists. Sample subject loss for the study, due to attrition, was nine students, of which three were from each of the three study groups. Four students from the Grade Five population were ineligible for sample selection because they failed to meet the intelligence criteria used in this study. This was a minimum verbal intelligence score of 80, based on the *Canadian Cognitive Abilities Test* (1971). Thus almost the entire population of Grade Five took part in this study. Participating teachers were assigned to sample sub-groups by random draw from a hat.

Permission was obtained from County of Lacombe school officials to involve the fifth grade classrooms in the study. As each instructional method employed in the study entailed the participation of the total student body in each class (rather than requiring specific students), and since the spelling lists from the authorized basal speller (*Spelling In Language V*, Kusk and Webster, 1976) were used, parental permission was regarded as unnecessary by County officials.

At this point, I would like to express my appreciation to the County of Lacombe School Board, the superintendent, the principal, vice-principal and the teachers of the Lacombe Upper Elementary School. Their whole-hearted co-operation was a major contributing factor to the success of this study.

Control Variables

(i) Time of Day. Instruction in the upper elementary school proceeded on a semi-departmental plan. However, to offset any possible effects on spelling achievement results due to the *time of day* factor, all fifth grade students received spelling lessons at the same time daily.

(ii) Time Allotted To Daily Instruction. While each spelling period was considered as being thirty minutes in length, five minutes were lost as the students changed rooms. Therefore, actual instructional time for the study was twenty-five minutes daily, for four days per week, for eight weeks.

(iii) Teacher Training And Experience. Initially five teachers volunteered their assistance and three teachers were employed as spelling instructors. In order to eliminate any effects from varied teacher training and experience, the criteria of possession of a Bachelor of Education degree and a minimum of ten years teaching experience was set. All the teachers met this criteria.

C. Selection Of The Sample

After obtaining permission from the County of Lacombe school officials for the Grade Five students to participate in the study, the cumulative records were consulted to select those students who met the sampling criteria. All the students except nine met the criteria established for sample membership. Random sample selection resulted in a total of three groups of twenty-six subjects each. The allocation of the three groups as the Control Group, the Experimental Group 1 and the Experimental Group 2 was determined by random sampling involving a draw from a hat. With a subject loss of three members in each group, due to the subjects leaving the Lacombe school, the final number of subjects in each group was reduced to twenty-three. Thus the total sample of subjects in the study was reduced to sixty-nine.

Descriptive statistics for the total sample included a mean Verbal I.Q. of 107.00, and a mean chronological age of 122.35 months. Similar statistics of each of the three experimental groups did not differ significantly from the total sample or from each other.

In summary, the sample involved three groups, randomly assigned as the Control Group, Experimental Group 1 and Experimental Group 2. Each group was composed of twenty-three subjects, for a total of sixty-nine subjects in the study. Little variability was present between the groups in terms of age and I.Q., and the control variables of the study.

To measure both pre-instructional and post-instructional spelling achievement, three spelling measures were administered.

D. Instruments

The following instruments were used to operationally define verbal intellectual ability and spelling achievement. Verbal intellectual ability was measured through the *Canadian Cognitive Abilities Test*, 1971 edition.

To increase criterion validity, three tests of spelling achievement were utilized. These included the *Stanford Achievement Spelling Test* (*Intermediate Battery, 1943*), the *Schonell Graded Word Spelling Test (1955)* and an *Informal Spelling Inventory*. These measures were all used as dependent measures of spelling achievement. All three spelling achievement measures employed the recall format of test presentation, rather than the recognition type. Simon and Simon (1973) and Otto, McMenemy and Smith (1973), when referring to appropriate spelling measures, stated that the recall type is more difficult but also more valid than the recognition type. The recognition type only requires the speller to recognize the correct form of the word, while not being able to recall and spell it. The recall type of spelling test is also typically used for testing in schools.

The Canadian Cognitive Abilities Test, 1971 Edition

The *Canadian Cognitive Abilities Test*, (CCAT--Thorndike and Wright, 1971) has a written format designed to measure the student's ability to use three skill areas: verbal, numerical, and geometric and figural symbols. Each of these skill areas is measured by a different battery of tests. A Verbal Battery measures comprehension of verbal symbols, a Quantitive Battery assesses numerical abilities and a Non-Verbal Battery measures understanding of geometric and figural symbols. While each battery is assessing distinctive abilities, the test authors recognize that a common cognitive factor (also called the G factor) exists due to battery overlap. Each of the test batteries has a standard error of measurement of 3.5 score points.

Norms for interpreting test results are presented in five forms: standard scores by age, precentile ranks by age, stanines by age, percentile ranks by grade and stanines by grade. This format allows comparison of the cognitive development of each student to either his age or grade peers. The *Standard Age Score (SAS)* was selected as the measure most relevent to the study. The SAS is a normed scale score with a mean of 100 for each age group on each test battery and a standard deviation of 16. A given numerical value for any age group has the same meaning in relationship to relative standing in the group. The test band on each side of the SAS includes plus and minus two times the standard error on either side of the obtained SAS. This band includes the *true* score ninety-five percent of the time. The numerical denotations of the SAS scores are related to the corresponding verbal categories that encompass abilities from *very low*, *below average*, *average*, *above average* and *very high*.

As the test authors did not recommend averaging the resultant scores of the three batteries, the Verbal Battery scores have been selected as having the closest relationship to verbal abilities and hence to spelling achievement (Smith, 1974). An SAS of 80, which relates to the eleventh percentile rank by grade and to the middle of the categorical rating of *below average* functioning, represented the minimum level of acceptable verbal intellectual abilities for sample membership.

The Schonell Graded Word Spelling Test, 1955 Edition

The *Schonell Graded Word Spelling Test* (Schonell, 1955) was designed for students from age six to age fifteen and grades one to ten. The spelling sub-tests includes dictation lists of one hundred spelling words. Each word is first pronounced, then used in a standard sentence, and finally called again before it is spelled by the subjects.

Equivalent forms A and B of the test are used as pre-test and post-test, respectively.

With regards to the validity and reliability of the test, the *Schonell Graded Word Spelling Test* was reviewed in the *Fifth Mental Measurements Yearbook* (Buros, 1955). It was noted that the test items were drawn from the *Schonell Essential Spelling List*. In the review of the test, John Nisbet stated that the test-retest reliability, based on the scores of ten thousand children, was .96. Nisbet also noted that the grade range of words utilized in the Schonell test provided headroom in measuring achievement for the ablest spellers. No information concerning test validity was available. However, the test is still widely used in British schools and research (Hicks, 1980), and in Alberta schools as a measure of spelling achievement.

The Stanford Achievement Spelling Test, 1943

The *Stanford Achievement Spelling Test* was designed for grades two to eight (Kelley, Ruch and Terman, 1943). The spelling sub-tests each present dictation lists of fifty spelling words. Like the Schonell, the word is pronounced, used in standardized sentence context, then pronounced again in isolation after which the subjects spell the word. Sub-tests E and H were used as a pre-test and post-test respectively in the study to determine grade achievement scores.

The *Stanford Achievement Spelling Test*, 1943 edition, was chosen as a measure of standardized spelling achievement because it is a test of recall. The newer editions of the test did not meet the criteria of the study, which require recall, rather than recognition format. This test is appropriate to the sample grade level and has sub-tests which allow for pre-test and post-test measurement of spelling performance.

With regards to the validity and reliability of the test, the *Stanford Achievement Spelling Test*, Intermediate Battery was reviewed in the *Fourth Mental Measurements Yearbook*, 1953. In the review, Virgil Herrick in using the Thorndike-Lorge and Rinsland word lists as criteria, pronounced *Stanford Achievement Spelling Test* as containing words that were accurately graded for difficulty and found in the vocabularies of children. Paul Hanna also stated that the coefficients of reliability of the *Stanford Achievement Spelling Test* (1943) ranged between .71 to .95 for the sub-tests (Fourth Mental Measurements Yearbook, Buros, 1953). Reliability data was based on test results from 300,000 pupils in 173 communities in 32 states of the United States. Hanna perceived the national norms to have been carefully constructed. The traditional norms are used for this study.

Little information was available concerning the validity of the test. However, Herrick noted, in his review of the Stanford, that the items included in the test discriminated between the achievement of different individuals and that the items in different test forms were comparable (*Fourth Mental Measurements Yearbook*, Buros, 1953). Salvia and Ysseldyke (1981), in their review of the Stanford, also stated that the validity of the Stanford was primarily content validity, and that the standardization, reliability, and validity were exceptionally good.

Informal Spelling Inventory

The *Informal Spelling Inventory* is an unnormed measure of the student's general spelling achievement. The Inventory was developed by the investigator specifically for this study and only compares a subject's score to those of other sample subjects in terms of percentage of words spelled correctly. The Mann and Suiter (1974) instructions for construction of an informal spelling inventory were used in this study. This procedure for selection of words for a spelling inventory was based upon determining the number of words taught at a particular level, and dividing this figure by twenty. The resultant number indicated the position of the words in the total word list that would be chosen for the inventory (Wallace and Larsen, 1979). In this study, the total list of words from the basal Grade 5 speller used was 160. Dividing this number by 20 meant that every eighth word from the total spelling list is included in the informal inventory. This selection resulted in an informal spelling inventory of 20 words.

The starting place for inventory word selection in the total list was determined by the investigator closing eyes and pointing to a word. This word became the first word on the inventory and every eighth word, thereafter, was selected. The word lists are arranged in rows and columns. The count for every eighth word proceeded downwards towards the bottom of the column. When the count reached the end of the last column of words, it recommenced at the top of the first column. Selection continued in this manner until 20 words were chosen for each inventory. Two informal spelling inventories, Lists A and B, were developed in this manner to act as a pre-test and post-test of spelling achievement of the spelling words taught in the duration of the study. The resultant spelling achievement scores were utilized as dependent spelling measures for the three instructional approaches used in this study.

To test its validity, the inventory was given to a Grade Five teacher in another school who compared the inventory results with those of the basal weekly results. The teacher responded favorably on the correspondence of the results.

E. Instructional Approaches

The three instructional approaches used in this study included the traditional study-test method, the test-study-test approach and the multi-channel multi-modality instructional method. Each instructional approach was utilized with a different group, over an eight-week period. The Control Group used the study-test method, while Experimental Group 1 followed the test-study-test approach and Experimental Group 2 used the multi-channel multi-modality method.

Traditional Study-Test Instructional Method

The traditional study-test instructional method is based on the use of the basal spelling series. Using the traditional approach, the students learn their spelling words through a series of activities. All the words in the lesson become the study list. Possible activities would involve the spelling test exercises, playing spelling games, creative story writing utilizing list words, defining list words, *etc.* (Turnbull and Schulz, 1979). Written exercises from the text are designed to extend word meaning of spelling list words or draw attention to the regularity or irregularity of the phonology. The spelling activities are concluded by a mastery test on the list words at the end of the weekly unit. In this study, the subjects who were instructed in the traditional spelling approach are hereafter referred to as the Control Group.

Test-Study-Test Instructional Method

The test-study-test method usually begins each weekly spelling lesson with the teacher and students pronouncing the list words and discussing the unfamiliar words. Next, a pre-test of the unit list words is dictated with the students correcting their own work. Each student then acquires his or her own study list, based upon his or her pre-test errors, which are studied through a series of steps such as writing out errors correctly, closing eyes and trying to visualize the word, using the word in sentence context, *etc*. Meanings of unfamiliar words are discussed. Spelling exercises and activities similar to those of the traditional method are followed through the week (Turnbull and Schulz, 1979). At the end of the week's spelling activities and study, a mastery test on the whole basic word list is given. Students keep progress charts of their own pre-test and mastery test results. Any errors by each student on the mastery test are added to his or her study list for the following week. Hereafter in this study, the sample group being instructed by the test-study-test method shall be referred to as Experimental Group 1.

Multi-Channel Multi-Modality Instructional Method

The multi-channel multi-modality instructional method is based upon the theory of spelling behaviors proposed by Personke and Yee. This method begins each weekly spelling unit with a pre-test of the 20 list words. Each student corrects his own test and creates his own study list, based on pre-test errors. On each of four instructional days, the instructor teaches five of the 20 basic list words plus their derivative forms. Instruction centres on developing correct word pronunciation, word meanings of the basic list words plus the effect on meaning of the addition of prefixes, suffixes and affixes and the development of correct orthography. The regularities and irregularities of the orthography are studied in relation to phonology and the development of appropriate spelling generalizations. The orthography is developed by individual letter sequencing, then syllabic sequencing of list words and derivative forms, using a multi-channel multi-modality presentation.

The multi-channel multi-modality presentation requires that the students are each provided with a written model of the list words and their derivatives which they simultaneously trace while they are saying the word as a unity, then in letter-by-letter sequence and finally in syllables. To strengthen individual spelling weaknesses, each student uses the provided model to re-study (by the multi-channel multi-modality approach) any pre-test errors and their derivative forms which were included in the daily lesson. At the end of the weekly spelling unit, a mastery test on the basic list words is given. Students keep progress charts of their own pre-test and mastery test results. Hereafter in this study, the sample group being instructed by the multi-channel multi-modality method shall be referred to as Experimental Group 2.

F. Procedure

Pilot Project

A pilot project was conducted in the middle of June for two weeks to test the clarity of the investigator--constructed directions for the multi-channel multi-modality method of spelling instruction. The directions were administered to a class of thirty students by a Grade Six teacher, who utilized the word lists in the spelling text, *Spelling in Language Arts VI* (Kuska and Webster, 1976). Two units of spelling were taught, at the rate of one unit per week. Each unit involved four instructional periods, and one testing period, of approximately twenty-five minutes each in duration. One instructional period was held each day. Revisions and changes in directions were made on a daily basis wherever they were found to be cumbersome or lacking in clarity by the teacher.

Collection Of Standardized Intelligence Quotients

The *Canadian Cognitive Abilities Test*, Form 1, Levels A-F was administered to the entire fifth grade in September of 1981, by school authorities. Permission was granted by the school authorities for the investigator to extract the test results from the student cumulative records. The Verbal Battery scores were selected as the abilities most relevant to spelling achievement (Smith, J., 1974). An SAS of 80, which relates to the eleventh percentile rank by grade and the middle of the categorical rating *below average* functioning represented the minimum level of acceptable verbal intellectual abilities for sample membership.

Directions To Teachers Of Experimental Groups

After the sample had been assigned to the experimental groups or the control group, the teachers of the experimental groups were instructed in the presentation of the instructional approaches appropriate to their group. Written directions for the use of each instructional approach were given to the teachers of the experimental groups. Capital letters were used on the directions to be specifically read to the students, to facilitate ease in locating the directions by the teachers.(See Appendix F.)

Testing Of Spelling Achievement

(i) Pre-tests. One week before the experimental spelling instruction commenced, the investigator administered the pre-tests to the students in their respective classrooms. The spelling pre-tests included Form E of the *Stanford Achievement Test* (1943), Form A of the *Schonell Graded Word Spelling Test* (1955) and List B of the *Informal Spelling Inventory* drawn from the word lists to be taught.

(ii) Post-tests. At the conclusion of eight weeks of instruction, the following post-tests were administered: Form H of the *Stanford Achievement Test*, 1943; Form B of the

Schonell Graded Word Spelling Test (1955), and List A of the *Informal Spelling Inventory*.

Administration and Scoring Of Tests. Both forms of the pre-tests and post-tests were administered and marked by the investigator to ensure uniformity in administration and scoring. Both pre-tests and post-tests utilized an oral format. The word to be spelled was first pronounced, then used in a sentence context and again pronounced after the subjects had had time to write the word. No further repetitions of the word were permitted.

In scoring the tests, the words were marked either right or wrong, with absolute accuracy as the scoring standard. If two or more spellings were allowed for a word by a standard dictionary, either spelling was accepted as correct. Incorrect capitalization was not marked as a spelling error. If the subject wrote the word twice, without attempting to eliminate either word, the first sample was marked and accepted.

VII. RESULTS AND DISCUSSION

A. Introduction

This study investigated the effects of three instructional spelling interventions on three groups of fifth-grade children in a rural community in Alberta. This chapter, therefore, presents, analyzes and interprets the data arising from the investigation. To facilitate following the data analysis, the chapter is divided into a number of sections, each reflecting the type of analysis used to deal with the statistical data.

First, an overview of the results is presented as it relates to the hypotheses tested in the study. Following the overview, the results of the study are presented under the following headings:

1. *Descriptive Statistics* - a description of the sample characteristics with respect to age and IQ, two of the control variables of the study, and initial spelling achievement among the group. Means and standard deviations are tabulated and graphical formats provide the basis of this subsection.
2. *One-way Analysis Of Variance* - this method is used to determine whether mean differences on the control variables of age and IQ, and the variable of initial spelling achievement are statistically significant for each of the groups to start with.
3. *Correlational Analysis* - this method is applied to the

pre-test and post-test data for each of the three spelling instruments used in the study. The purpose of this analysis is to examine the criterion validity of the Schonell and Informal Inventory tests used. Three instruments, *Schonell Graded Word Spelling Test*, the *Informal Spelling Inventory*, and the *Stanford Achievement Spelling Test*, constitute the dependent variables of the investigation.

4. Gain-score Data Analysis - this method is used to investigate pre-test/post-test gains as a function of the instructional method used. The hypothesis tested is related to the intensity of the spelling methodology used and ranges from the traditional spelling instruction for the Control Group, to increasing intensity of instruction for Experimental Groups 1 and 2.
5. *Two-factor Analysis Of Variance* - this analysis of variance, with repeated measures on Factor B, the pre-test/post-test scores (Winer, 1979), was carried out to test Hypotheses 1, 2, 3 and 4, the main focus of the study. The analysis was seeking to determine from the data collected, which of the three methodologies was statistically superior after eight weeks of intensive experimental spelling instruction. Hypotheses 1, 2, 3 and 4 were tested for each of the three dependent variables in order to increase the criterion validity of the study.

B. Overview Of The Results

The four hypotheses tested in this section of the data analysis are restated for the convenience of following the analysis of the data. The main findings related to each hypothesis are pointed out.

Hypothesis 1

Experimental Group 2, receiving multi-channel multi-modality spelling instruction, will show statistically significantly greater spelling gains at the end of the eight-week instructional period than the Control Group receiving the study-test instruction. This hypothesis was partly confirmed for the Schonell but not for the other measures used.

Hypothesis 2

Experimental Group 2, receiving multi-channel multi-modality spelling instruction, will show statistically greater spelling gains at the end of the eight-week instructional period than Experimental Group 1 receiving the test-study-test instruction. This hypothesis was partly confirmed for the Informal Inventory but not for the other measures used.

Hypothesis 3

The Experimental Group 1, receiving test-study-test instruction, will show statistically significantly greater spelling gains than the Control Group receiving study-test instruction, but less gain than Experimental Group 2 receiving the multi-channel multi-modality instruction. This hypothesis was not confirmed for any of the measures used.

Hypothesis 4

The Control Group, receiving the traditional study-test instruction, will show the least statistically significant spelling gains when compared with Experimental Group 2. This hypothesis was not confirmed for any of the measures used.

C. Descriptive Statistics

With respect to the chronological age and IQ of the total sample (N = 69), the mean chronological age is 122.35 months, with a standard deviation of 3.62, while the mean IQ is 107.99, with a standard deviation of 8.91.

The mean scores and standard deviations of each of the three subgroups are compared in Table VII.1 with respect to chronological age, both among themselves and with respect to the chronological age of the total sample. The mean chronological ages are:

Control Group	122.26 months
Experimental Group 1	122.36 months
Experimental Group 2	122.52 months

Essentially, these statistics reveal that the groups are fairly homogeneous with respect to chronological age. A similar conclusion can be drawn when the chronological age of each of the three groups is compared with that of the total sample (122.35 months).

TABLE VII.1

A COMPARISON OF MEANS AND STANDARD DEVIATIONS OF THE CHRONOLOGICAL AGE IN MONTHS AND THE IQ OF THE TOTAL SAMPLE AND THE GROUPS

GROUPS		AGE		IQ	
		M	SD	M	SD
Total Sample	(n = 23)	122.35	3.62	107.99	8.91
Control Group	(n = 23)	122.26	4.09	109.17	6.29
Experimental Group 1	(n = 23)	122.36	3.59	107.82	8.91
Experimental Group 2	(n = 23)	122.52	3.30	107.61	9.29

In observing the variability among these three groups on the basis of chronological age, Table VII.1 and Figure VII.1 show that the least variable group is Experimental Group 2, with a standard deviation of 3.30; while the most variable group is the Control Group with a standard deviation of 4.09. Again, these differences observed are non-significant.

As with chronological age differences, the three groups follow the same pattern with respect to the control variable of IQ Table VII.1 reveals that the mean IQ of the Control Group is 109.17; for Experimental Group 1, 107.82; and for Experimental Group 2, 107.61. These statistics reveal that the groups are essentially homogeneous with respect to IQ, with non-significant differences among them or in comparison with the IQ of the total sample (107.99).

When the IQ variability of the three groups is examined (see Table VII.1), it is seen that the most variable group with respect to IQ is Experimental Group 2. Experimental Group 1 is the least variable. Again, these differences are non-significant.

In observing the variability among the three groups with respect to initial spelling achievement, the mean scores and standard deviations of each of the three subgroups are compared in Table VII.3. The raw mean spelling achievement scores of the *Schonell Graded Word Test* are:

Control Group	58.261
Experimental Group 1	55.087

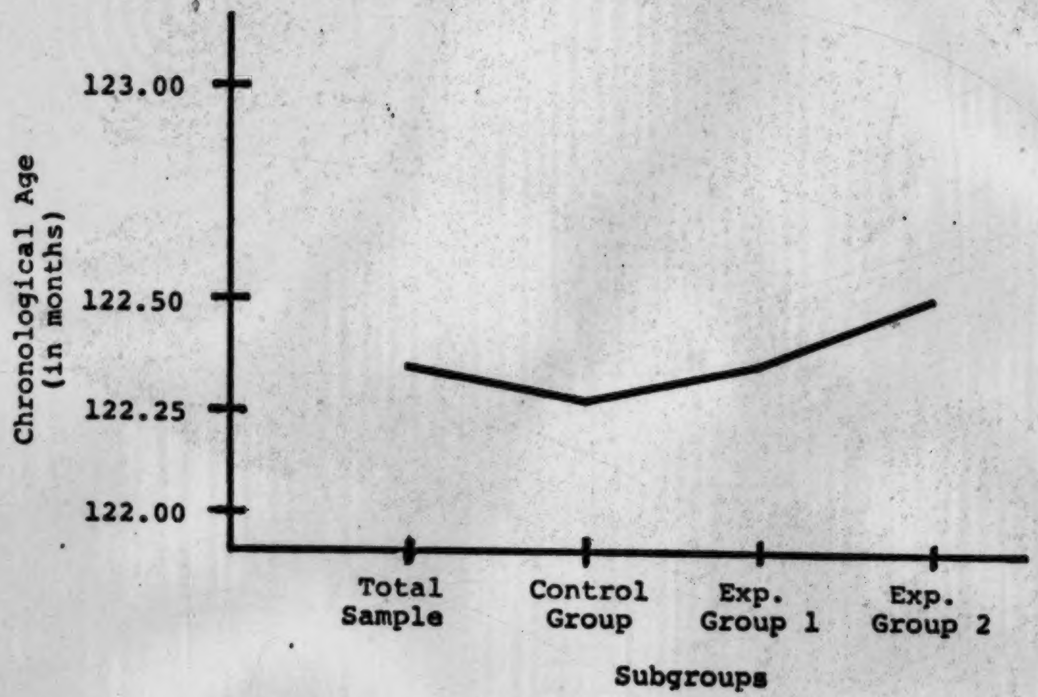


Figure VII.1
Mean Chronological Ages Of The Groups
As Compared To The Total Sample

Experimental Group 2	58.261

Essentially, these statistics are fairly homogeneous, relative to initial spelling achievement. The least variability is present in Experimental Group 2, with a standard deviation of 5.926 and the greatest variability is in Experimental Group 1, with a standard deviation of 11.960.

In regards to the initial spelling achievement scores on the *Stanford Achievement Spelling Test*, the results are:

Control	56.565
Experimental Group 1	54.869
Experimental Group 2	56.609

Again, the statistics are fairly uniform, relative to initial spelling ability. The least variability is displayed by the Control Group, with a standard deviation of 5.882, while the most variability is present in Experiment Group 1, with a standard deviation of 9.242.

In respect to the *Informal Spelling Inventory*, the initial spelling achievement scores are:

Control	72.826
Experimental Group 1	70.000
Experimental Group 2	73.913

Statistically, the initial spelling achievement scores display limited variation. The least variability is evident in the Control Group, with a standard deviation of 13.499, and the greatest degree of variation is found in the Experimental Group 1, with a standard deviation of 19.111.

In summary, statistical comparison of the descriptive statistics, means and standard deviations for the three groups across the three dependent measures with respect to initial spelling achievement reveals that the differences observed on the variables are not statistically significantly different. This finding is applicable to these groups across each of the three measures.

In summary, statistical comparison of the descriptive statistics of means and standard deviations for the three groups with respect to chronological age, IQ and initial spelling achievement reveals that the differences observed on those variables are not significantly different statistically. This same finding applies to a comparison of each of these groups to the total sample on the variables of age and IQ, and to the three groups on each of the three test measures on the variable of initial spelling.

On the basis of the analysis of the descriptive statistics, it can be concluded that the variables of age, IQ, and initial spelling achievement are adequately controlled in this study, and are not likely to be biassing factors in the investigation of the relationship between spelling performance as a function of the three different methodologies used. However, this conclusion will be further investigated by a One-way Analysis of Variance in order to determine whether the mean differences observed on the basis of age, IQ, and initial spelling achievement of the three groups, are statistically significant.

D. One-way Analysis Of Variance

This analysis is used to determine whether mean differences found with regards to chronological age and IQ of each of the three groups are significantly statistically different to start with.

A look at Table VII.2, which summarizes the results of the one-way ANOVAs for each of the three groups on each of the two control variables of age, IQ, and initial spelling ability reveals a non-significant F for age ($F(2/68) = 0.035$; $P < 0.966$), and a similar non-significant F for IQ ($F(2/68) = 0.314$; $p < 0.7315$). Thus, the three groups are not statistically different in both chronological age and IQ.

In regards to variable of initial spelling achievement, Table VII.4 summarizes the results of the one-way ANOVA (ANOVA 16) for each of the three groups on each of the three dependent spelling measures. Results indicate a non-significant F for differences in initial spelling achievement on the Schonell measure ($F\ (2/68) = 0.71$; $p < 0.495$), on the Stanford measure ($F\ (2/68) = 0.38$; $p > 0.684$), and on the Informal Inventory measure ($F\ (2/68) = 0.34$; $p = 0.710$). Thus the three groups are not statistically different in initial spelling achievement.

In summary, the one-way ANOVAs are consistent with the slight age, IQ and initial spelling achievement mean differences observed in Table VII.1. These differences are found to be non-significant, thus indicating that the

TABLE VII.2

SUMMARY OF ONE-WAY ANOVA FOR THREE SPELLING GROUPS ON THE VARIABLES OF AGE AND I. Q.

SOURCE	DF	SS	MS	F-RATIO	P
Chronological Age ANOVA:					
Between Group	2	0.94	0.47	0.035	0.9658
Within Group	66	891.0417	13.5006		
Total	68	891.9832			
I. Q. ANOVA:					
Between Group	2	50.8606	25.43	0.314	0.7315
Within Group	66	5342.0815	80.94		
Total	68	5392.9414			

TABLE VII.3
A COMPARISON OF MEANS AND STANDARD DEVIATIONS FOR INITIAL
SPELLING ACHIEVEMENT AMONG THE GROUPS ON THE THREE DEPENDENT MEASURES

GROUPS		TESTS					
		Schonell		Stanford		Informal	
		M	SD	M	SD	M	SD
Control	(n=23)	58.261	10.848	56.565	5.882	72.826	13.499
Experimental Group 1	(n=23)	55.087	11.960	54.869	9.242	70.000	19.111
Experimental Group 2	(n=23)	58.087	5.926	56.609	7.082	73.913	15.319

TABLE VII.4

SUMMARY OF ONE-WAY ANOVA ON THE INITIAL SPELLING VARIABILITY AMONG THE THREE GROUPS FOR THE THREE DEPENDENT MEASURES

SOURCE	SS	DF	MS	F-RATIO	P
SCHONELL					
Groups	0.18756250E+03	2	93.78	0.34	0.710
Error	0.17989063E+05	66	272.56		
	STANFORD				
Groups	0.45247070E+02	2	22.62	0.38	0.684
Error	0.39137393E+04	66	59.30		
INFORMAL INVENTORY					
Groups	0.14636719E+03	2	73.18	0.71	0.495
Error	0.68040859E+04	66	103.09		

variables of age and IQ are well controlled and are not biassing factors in this investigation. That is, ages, IQ's and initial spelling achievement of the three groups are not significantly different statistically to start with.

E. Correlation Analysis

As a secondary focus, *Pearson Product Moment Correlation Analysis* is used to determine the criterion validity of the *Informal Spelling Inventory* developed for the study, and the *Schonell Graded Word Spelling Test* (Schonell, 1955). The relationship among these tests and the criterion measure, the *Stanford Spelling Achievement Test* (Kelley, Ruch and Terman, 1943), is investigated through *Pearson Product Moment Correlation*. The established validity of the Stanford test has been documented (Buros, 1953; Salvia and Ysseldyke, 1981).

Perusal of Table VII.5 reveals that significant intercorrelations were found among the three spelling measures used. The highest pre-test correlation was found between the Stanford pre-test and the Schonell pre-test ($r = 0.77$; $p = .0001$). The lowest pre-test relationship was between the Informal Inventory ($r = 0.56$) and the Schonell test. However, this correlation was significant at the 0.003 level. The pre-test correlation between the Stanford and the Informal Inventory was significant ($r = 0.72$, $p < .0001$).

Post-test intercorrelations (see Table VII.4) show the same consistent relationships among the three instruments.

TABLE VII.5

PEARSON PRODUCT MOMENT INTERCORRELATION COEFFICIENTS FOR THE STANFORD, SCHONELL, AND INFORMAL PRE-TEST AND POST-TEST SCORES FOR THREE GROUPS

TESTS	POST-TEST			PRE-TEST		
	STAN.	SCH.	INF.	STAN.	SCH.	INF.
Stanford Pre-Test	0.932	0.737	0.607	0.000	0.712	0.716
Schonell Pre-Test	0.737	0.858	0.675	0.772	0.000	0.561
Informal Pre-Test	0.607	0.561	0.737	0.716	0.561	0.000
Stanford Post-Test	0.000	0.750	0.610	0.932	0.737	0.596
Schonell Post-Test	0.750	0.000	0.592	0.737	0.858	0.592
Informal Post-Test	0.610	0.592	0.000	0.607	0.675	0.737

used as the dependent variables of the study. Like the pre-test measures, correlations among the three spelling measures based on post-test spelling scores of the total sample, were statistically significant. As with the pre-test analysis, the highest post-test correlation was found between the *Stanford Achievement Test* and the *Schonell Graded Word Spelling Test* ($r = 0.75$; $p < 0.0001$). Similarly, the weakest relationship was found between the Schonell and the Informal Inventory ($r = 0.59$; $p = 0.001$). Compared with the other correlations, the Informal Inventory tends to correlate less with both the Stanford ($r = 0.60$; $p = 0.001$) and the Schonell ($r = 0.59$; $p = 0.001$).

In summary, the three measures used tended to consistently measure spelling achievement at both the pre-test and post-test levels, with a similar pattern of significant relationships at each level measured. However, the main focus of this analysis was the relationship of two of the dependent measures to the *Stanford Achievement Spelling Test*, the criterion measure. At both the pre-test and post-test stages, the correlations were statistically significant, throwing some light on the criterion validity of the *Schonell Graded Word Spelling Test* and the *Informal Spelling Inventory* which was especially designed for the purpose of this study.

F. Two-factor Analysis Of Variance

This phase of the analysis is designed to analyze spelling achievenment data after eight weeks of intensive spelling instruction was applied to the three spelling treatment groups which included the Control Group, the Experimental Group 1 and the Experimental Group 2. The spelling instruction increased in intensity from the Control Group using the traditional method of spelling instruction, to the Experimental Group 2 which received a multi-channel multi-modality approach, the most intensive of the three instructional approaches.

Thus a 3 x 2 ANOVA (3 treatment groups x pre-testing/post-testing) was carried out on the results of each of the three spelling tests. The tests were the *Schonell Graded Word Spelling Test*, the *Stanford Achievement Spelling Test*, and an *Informal Inventory*. ANOVA 26, a two-factor analysis of variance with repeated measures on Factor B, the pre-test/post-test scores, and Factor A, the three treatment groups, was used (Winer, 1979). The mean scores from each of the three dependent measures for the three groups are analyzed separately.

Two-way Analysis Of Variance On The Schonell Graded Word Spelling Test

The results of the analysis of variance for the Schonell (see Table VII.6) reveal the following:

1. A significant effect of repeated measures, Factor B

TABLE VII.6

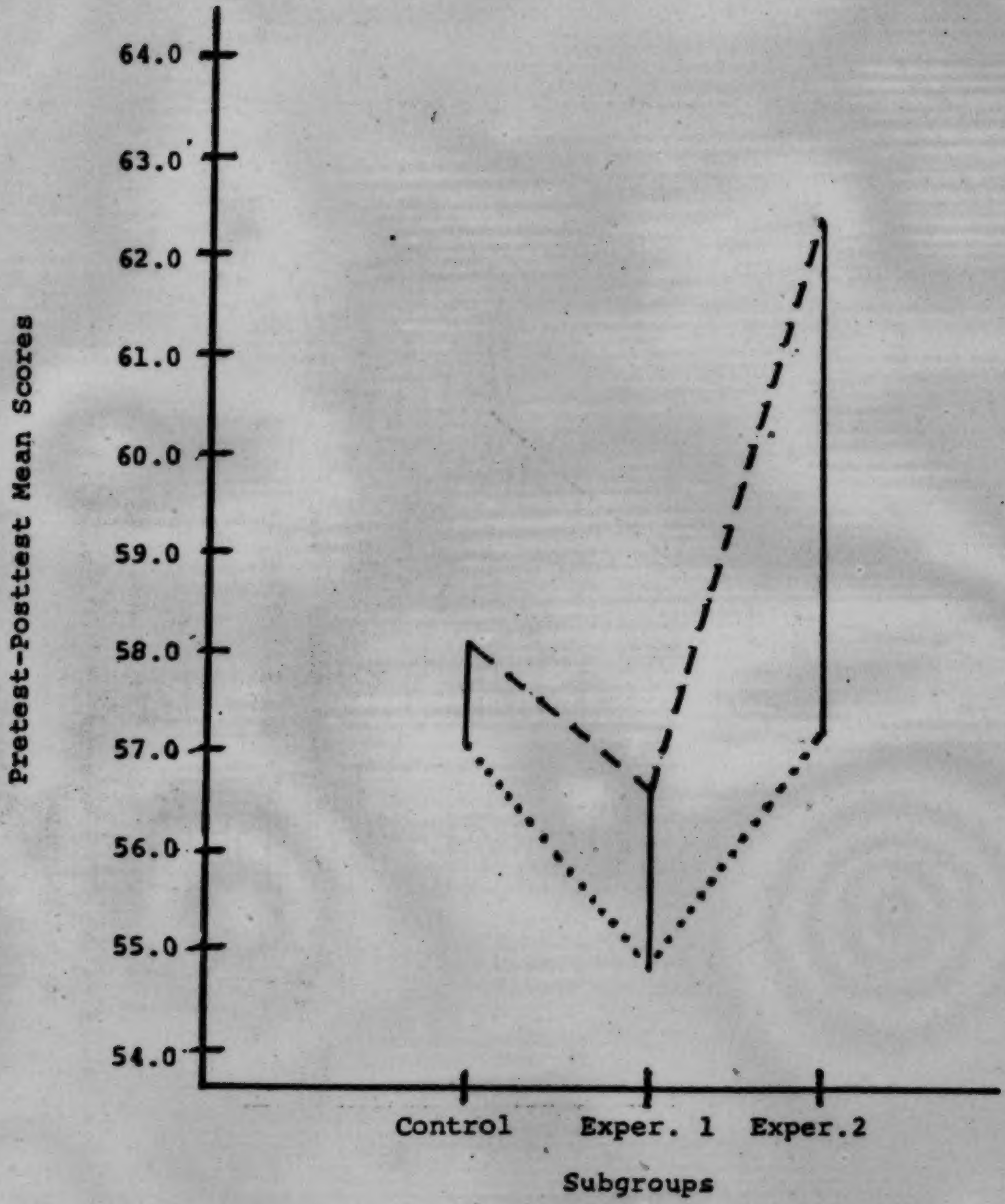
SUMMARY OF TWO-WAY ANOVA WITH REPEATED MEASURES ON PRE-/POST- TESTING ON THE SCHONELL GRADED WORD SPELLING TEST FOR THE THREE GROUPS

SOURCE	SS	DF	MS	F	P
Between Subjects	1295.87	68			
"A" Main Effects (Groups)	452.363	2	226.182	1.229	0.29911
Subjects Within Groups	12143.625	66	183.994		
Within Subjects	1295.000	69			
"B" Main Effects (Pre-/Post-test)	295.766	1	295.766	21.652	0.00002
'A x B' Interaction	97.660	2	48.830	3.575	0.03357
"B" x Subjects Within Groups	901.563	66	13.660		

($F(2/66) = 295.76$; $p < .05$). That is, a significant effect from the pre-testing to the post-testing situations among groups.

2. A significant A x B interaction, that is, a significant treatment groups x pre-test/post-test interaction ($F(2/66) = 3.575$; $p < .05$). Thus, the magnitude of the pre-test/post-test differences varied in part as a function of the intensity of the instructional approaches used among groups (see Figure VII.2).
3. The differences among the groups, although having the expected trend, are non-significant ($F(2/66) = 1.23$; $p > .29$).

When the Scheffe test of simple main effects was applied to Factor B, the significant pre-test/post-test differences among the groups revealed that pre-testing/post-testing differences between the Control Group and Experimental Group 2 contributed significantly to the significant F obtained ($p < .05$). This finding of a general significant pre-test/post-test difference is not unexpected. However, the Control Group and the Experimental Group 2 discrepancy found is consistent with the prediction in Hypothesis 1. It should be noted, however, that on the contrary, Hypothesis 2 which predicted significant post-test differences between Experimental Group 1 and Experimental Group 2 and Hypothesis 3 which predicted significant pre-testing/post-testing differences between



Tests
1. (...) Pretest
2. (---) Posttest
3. (——) Magnitude of Differences

Figure VII.2
An Analysis Of Schonell
Pre-test/Post-test Magnitude Of Gains

Experimental Group 1 and the Control Group, were not confirmed, although the trends were in the predicted directions.

A x B Interaction

With respect to the A x B interaction (see Figure VII.2), a test of simple main effects was performed on the Treatment Groups x pre-test/post-test significant interaction. It was found that the magnitude of the pre-test/post-test differences on the Schonell Test varied within the three groups. The greatest disparity was between the magnitude of the pre-test/post-test differences between the Control Group and the Experimental Group 2. This difference contributed significantly to the significance of the observed F-test (see Table VII.4). However, differences between the Control Group and Experimental Group 1, and pre-test/post-test differences between Experimental Group 1 and Experimental Group 2, were non-significant and contributed little to the significant results obtained.

These findings again add to the confirmation of Hypothesis 1 which predicted a significant difference in the spelling performance on the Schonell Test for Experimental Group 2 over the Control Group as a function of the intensive multi-channel multi-modality spelling intervention used over the eight-week period. It should be noted, however, that while Hypothesis 1 has been confirmed, Hypotheses 2 and 3 are in the predicted direction.

With reference to the treatment effect, the multi-channel multi-modality approach therefore produced greater spelling performance than the traditional approach to spelling instruction applied to the Control Group.

Two-way ANOVA For The Stanford Achievement Spelling Test

Table VII.7 presents the results of the analysis of variance method used on the mean pre-test/post-test scores for the three treatment groups on the *Stanford Achievement Spelling Test*.

As with the Schonell Test results, the main effect for groups was non-significant (F(2/68) = 1.18; p > .31), and thus failed to meet the predictions of Hypotheses 1, 2, 3 and 4 which predicted significant group differences at the end of eight weeks as a function of the intensive spelling instruction used.

However, the results of the 3 x 2 ANOVA indicated a significant main effect of repeated measures (Factor B - F(1/66) = 62.69; p < .0001). This finding of a significant pre-test/post-test difference after eight weeks of instruction is not unexpected.

TABLE VII.7

SUMMARY OF TWO-WAY ANOVA WITH REPEATED MEASURES ON PRE-/POST- TESTING ON THE STANFORD ACHIEVEMENT SPELLING TEST FOR THE THREE GROUPS

SOURCE	SS	DF	MS	F	P
Between Subjects	6632.063	68			
"A" Main Effects (Groups)	229.641		114.820	1.184	0.31260
Subjects Within Groups	6402.875	66	97.013		
Within Subjects	954.500	69			
"B" Main Effects (Pre-/Post-test)	449.758	1	449.758	62.699	0.00000
'A x B' Interaction	31.176	2	15.588	2.173	0.12191
"B" x Subjects Within Groups	473.438	66	78.173		

Two-way ANOVA On The Informal Spelling Inventory

Table VII.8 presents the results of the analysis of variance method on the mean pre-test and post-test scores for the three treatment groups on the *Informal Spelling Inventory* especially designed by the author for this study and validated on the *Stanford Achievement Spelling Test*.

As with both the Schonell and the Stanford test results, the main effect for groups, Factor A, was non-significant ($F(2/68) = 1.253$; $p > .29$). These results are contrary to the predictions of Hypotheses 1, 2, 3 and 4 which predicted significant group differences at the end of the eight week intervention as a function of the intensity of the spelling instruction used.

Table VII.8 also reveals a significant B main effect for pre-test/post-test repeated measures. Unlike the Stanford B main effect, multiple comparisons on the Schonell using the Scheffe method revealed that there were significant differences between Experimental Groups 1 and 2 on the post-test scores ($p < .05$), as predicted in Hypothesis 2. Post-test differences for the Schonell and Stanford tests have been non-significant ($p > .05$). This significant post-test superiority of Experimental Group 2, the group receiving the intensive multi-channel multi-modality instruction, over Experimental Group 1, the group receiving less intensive spelling treatment, is important in the light of the initial equivalence of the groups with respect to IQ, chronological age, and pre-test

TABLE VII.8

SUMMARY OF TWO-WAY ANOVA WITH REPEATED MEASURES ON PRE-/POST- TESTING ON THE INFORMAL INVENTORY SPELLING TEST FOR THE THREE GROUPS

SOURCE	SS	DF	MS	F	P
Between Subjects	16646.750	68			
"A" Main Effects (Groups)	608.781	2	304.391	1.253	0.29248
Subjects Within Groups	16039.250	66	243.019		
Within Subjects	21975.000	69			
"B" Main Effects (Pre-/Post-test)	16087.512	1	16087.512	183.821	0.00000
'A x B' Interaction	111.406	2	55.703	0.636	0.532337
"B" x Subjects Within Groups	5776.125	66	87.517		

spelling performance (the Informal Inventory measure $p > .71$). Since these variables were equivalent to start with, it can be assumed that the post-test differences found on the Informal Inventory measure between Experimental Groups 1 and 2 may be due to the treatment used. However, this observation does not hold for the relationship between Experimental Group 2 and the Control Group.

In summary, there were significant Informal Inventory post-test differences between Experimental Groups 1 and 2, with Experimental Group 2 having a significantly superior performance. This difference was predicted in Hypothesis 2. Since there was control for age and IQ, and since pre-test differences were non-significant on the Informal Inventory it can be assumed that the treatment variable was significant with respect to these two groups.

The A x B interaction on the Schonell Test has been another important result of this study. The magnitude of the pre-test/post-test performance across groups varied in favor of a significant pre-test/post-test difference between the Control Group and Experimental Group 2. The difference between the Control Group and Experimental Group 1 was not significant. So also was the difference between Experimental Groups 1 and 2. Thus, with reference to Hypothesis 1, the predictions are upheld. This indicates that the multi-channel multi-modality approach produced the greatest pre-test/post-test magnitude when the Control Group and Experimental Group 2 are compared.

G. Pre-test/Post-test Gain Score Data Analysis

The purpose of this phase of the data analysis is to present graphically and descriptively the effect of the experimental treatment by comparing pre-test/post-test gains across the three treatment groups for each of the dependent variables used.

Since the groups were equivalent statistically to start with, and since both IQ and chronological age were controlled in each of the three samples, gains displayed graphically may be indicative of the spelling treatment used with mean pre-test/post-test gains being greater for Experimental Group 2 than would be the case for Experimental Group 1 or the Control Group.

A look at Table VII.9 indicates that mean pre-test/post-test gains differed for each of the measures used. Therefore, for convenience this analysis will focus on the mean gain scores for each of the three tests used.

Schonell Gain Score Analysis

According to Table VII.9, pre-test/post-test gain scores in spelling achievement on the *Schonell Graded Word Spelling Test*, was in the expected direction. The Control Group obtained a mean pre-test score of 58.087 and a post-test score of 59.130, showing a mean gain score of 1.043. The Experimental Group 1 obtained a mean pre-test score of 55.087 and a post-test score of 57.696, displaying a mean gain score of 2.609. The Experimental Group 2 had a

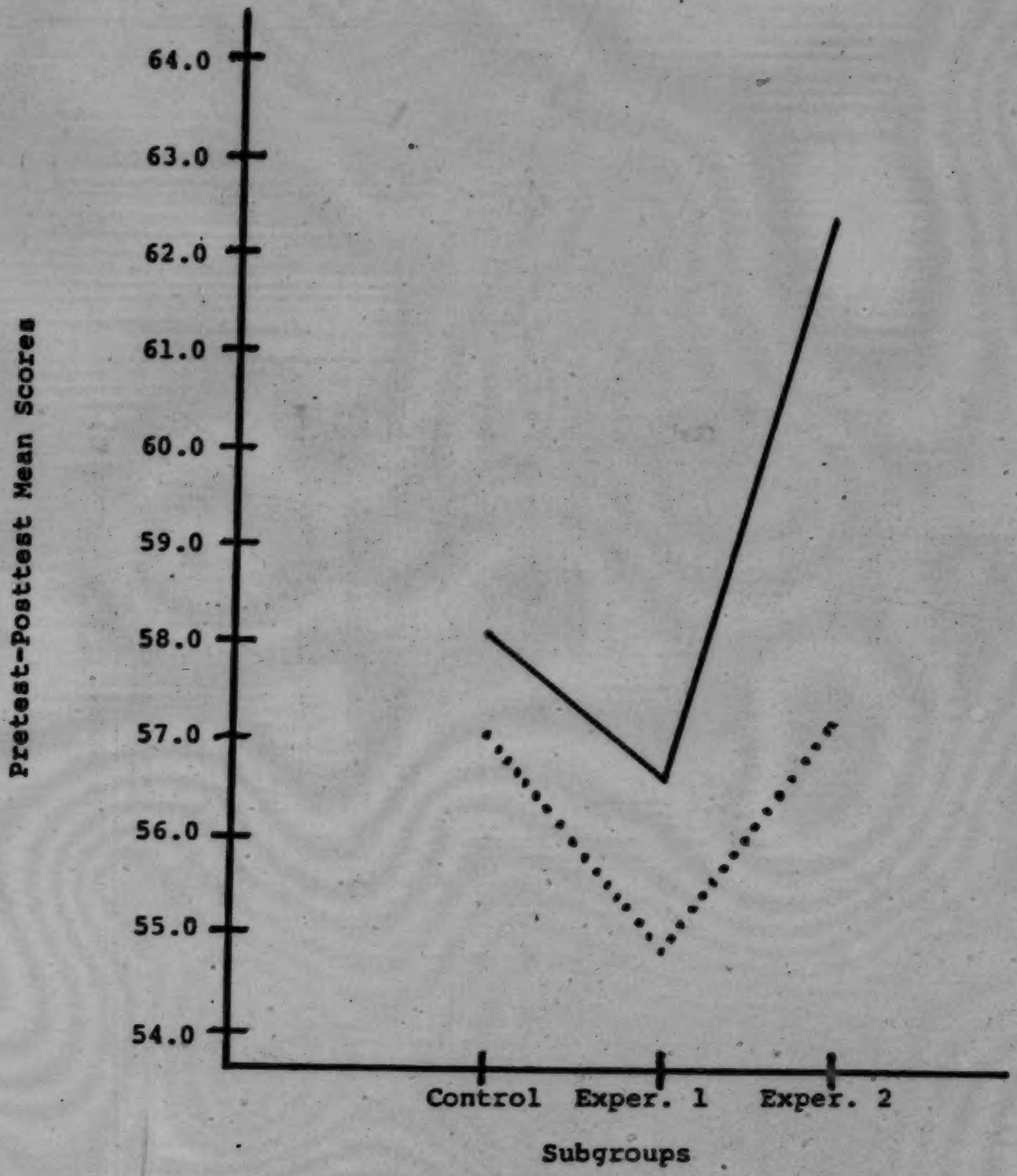
TABLE VII.9

PRE-/POST- TESTING MEAN GAIN SCORES FOR THE THREE TREATMENT GROUPS ON EACH OF THE SCHONELL, STANFORD AND INFORMAL INVENTORY SPELLING TESTS

GROUPS	MEAN PRE-TEST	MEAN POST-TEST	PRE-/POST-TEST MEAN GAIN SCORES
Informal Inventory Spelling Test			
Control Group	73.913	94.348	20.435
Experimental Group 1	70.000	90.217	20.217
Experimental Group 2	72.826	96.957	24.131
Stanford Achievement Spelling Test			
Control Group	56.565	60.696	4.131
Experimental Group 1	54.870	57.13	2.260
Experimental Group 2	56.609	61.043	4.434
Schonell Graded Word Spelling Test			
Control Group	58.087	59.130	1.043
Experimental Group 1	55.087	57.696	2.609
Experimental Group 2	58.261	63.391	5.130

mean pre-test score of 58.261 and a post-test score of 63.391, for a mean gain score of 5.130 (Table VII.9, Figure VII.3). In agreement with the direction of achievement as indicated in Hypotheses 1, and 3, the Experimental Group 2, utilizing the multi-channel multi-modality spelling methodology, achieved a greater gain score mean than either Experimental Group 1, receiving the test-study-test instruction, or the Control Group, receiving the study-test approach. Experimental Group 1 obtained a greater mean gain score than the Control Group.

With reference to Table VII.9 (Figure VII.4), spelling achievement comparisons of pre-test/post-test gain scores were also in the expected direction on the *Stanford Achievement Spelling Test* (1943). On this measure, the Control Group received a mean pre-test score of 56.565 and post-test score of 60.696, showing a mean gain of 4.131 in spelling achievement. Experimental Group 1 obtained a mean pre-test score of 54.870 and a post-test score of 57.130, indicating a mean gain score of 2.260. Experimental Group 2 obtained a mean pre-test score of 56.609 and a post-test score of 61.043, obtaining a mean gain score of 4.434 (Figure VII.4; Table VII.9). The findings for Experimental Group 2, which utilized the multi-channel multi-modality spelling methodology and attained the greatest mean pre-test/post-test score, are in agreement with the direction of achievement predicted in Hypotheses 1 and 2. However; the findings for the Control Group, which obtained



Tests
1. (...) Pretest
2. (___) Posttest

Figure VII.3
An Analysis Of Schonell
Pre-test/Post-test Mean Scores

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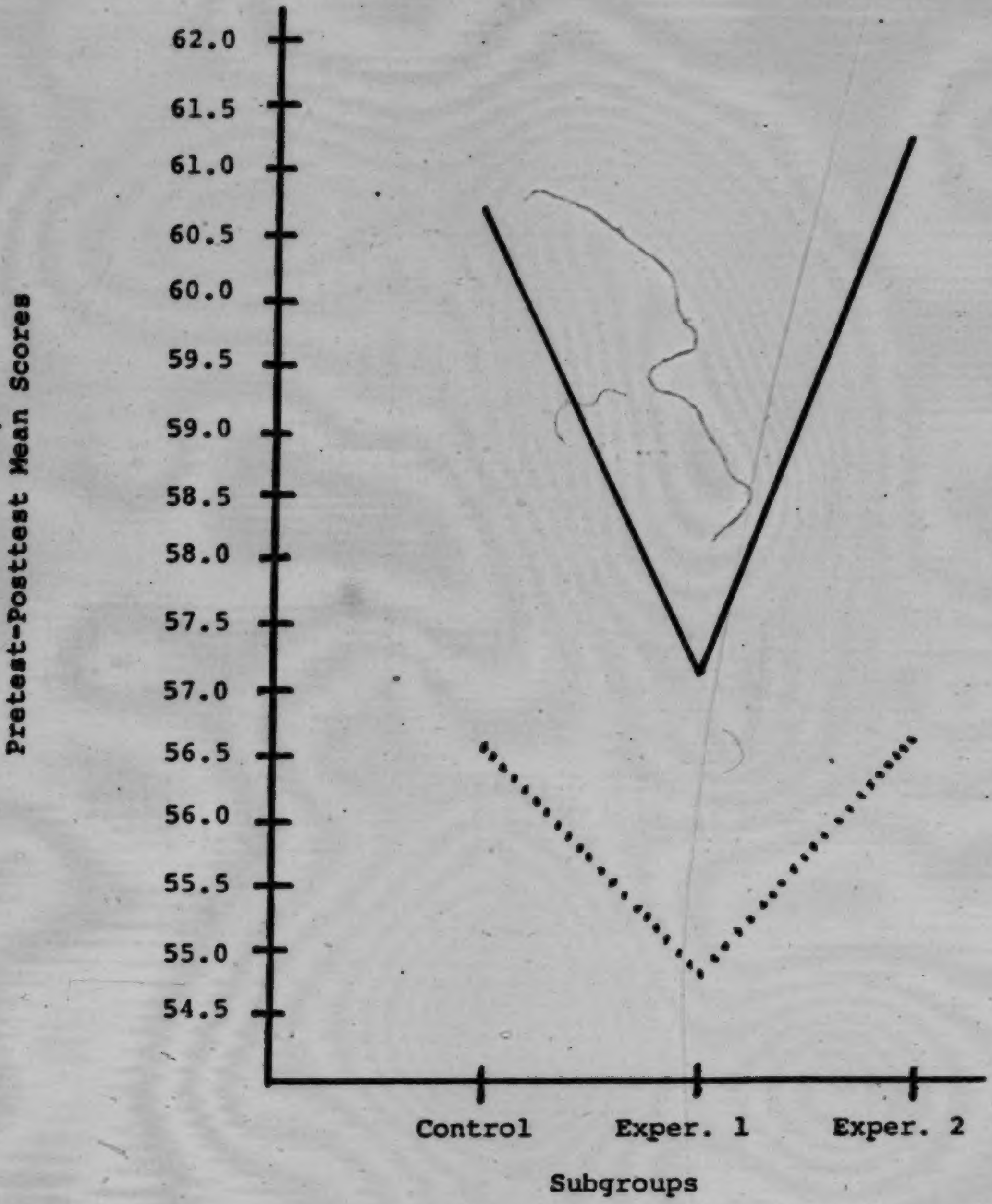

Tests
1. (...) Pretest
2. (___) Posttest

Figure VII.4
An Analysis Of Stanford
Pre-test/Post-test Mean Scores

a greater mean gain score than Experimental Group 1, are contrary to the predictions of Hypotheses 3 and 4 which indicated that the Control Group would show the least spelling gains.

Informal Inventory Gain Score Analysis

A look at Figure VII.5 and Table VII.9 indicates that the Control Group exhibited a mean pre-test percentage score of 73.913 and a post-test percentage score of 94.348, resulting in a mean percentage gain score of 20.435. The Experimental Group 1 obtained mean pre-test and post-test percentage scores of 70.00 and 90.217, for a mean percentage gain score of 20.217. Experimental Group 2 obtained mean pre-test, post-test and gain scores of 72.826, 96.957, and 24.131, respectively. These findings, indicating that Experimental Group 2 obtained the greatest mean percentage gains, are in agreement with Hypotheses 1 and 2. Predictions that the Control Group would achieve the least gains were not upheld.

Summary

A graphical comparison of achievement for the Control Group, Experimental Group 1 and Experimental Group 2 was obtained for pre-test/post-test mean gains. This comparison was based on the mean gain scores from the pre-test to the post-test situation. In all three of the measures, the mean gain scores of Experimental Group 2 were superior to the

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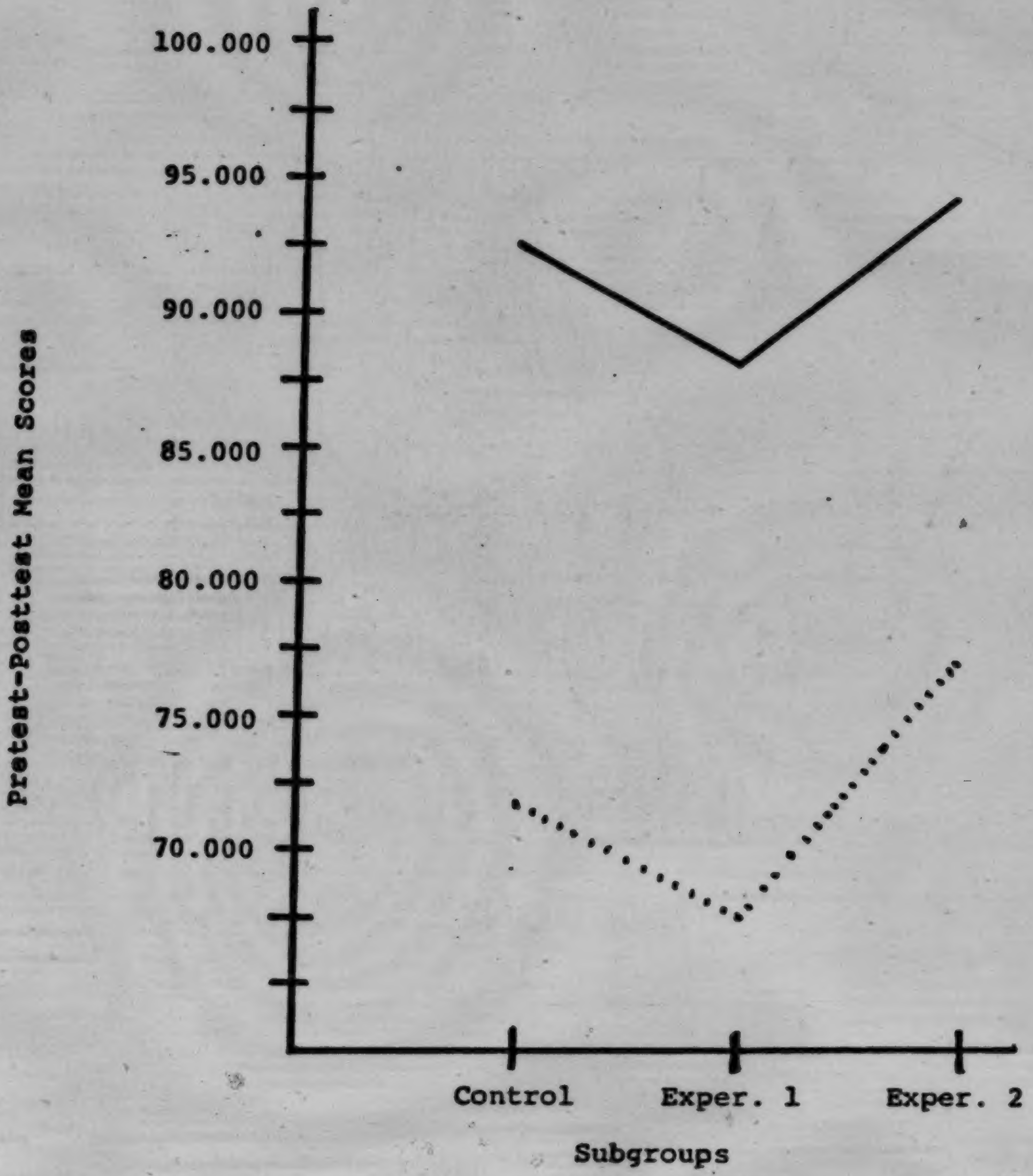

Tests
1. (...) Pretest
2. (___) Posttest

Figure VII.5
An Analysis Of The Informal Inventory
Pre-test/Post-test Mean Scores

mean gain scores of both the Control Group and Experimental Group 1 (see Table VII.9). This result was consistent with the direction of achievement predicted in Hypotheses 1 and 2. However, the predictions of Hypothese 3 and 4, indicating that the Control Group would achieve the least gains, were not confirmed.

H. Discussion Of The Results

The results of the various analyses lend partial support to Hypotheses 1 and 2 which state that the multi-channel multi-modality approach to spelling instruction is more effective in the improvement of spelling than the traditional basal spelling approach or the test-study-test method. While the linear improvement in spelling as a function of the intensity of methodology used did not hold true in this study, the trends were evident when examined graphically. As noted in the discussion of the limitations, a number of methodological factors may have contributed to this lack of linear improvement as hypothesized. Contrary to expectations, the performance of Experimental Group 1 was consistently inferior to that of the Control Group on almost all of the dependent measures used.

Design limitations can be removed from any consideration of the artifacts noted above. Age and IQ were well controlled. Randomization was a facet of the design and pre-test differences among groups on each of the dependent measures were non-significant. Even the dependent measures correlated highly with one another. The criterion validity of the *Informal Spelling Inventory* designed especially for the study was established as a secondary focus of the investigation. In controlling for chronological age and IQ, one-way ANOVA was used to further analyze the slight mean differences observed in describing the control characteristics of the sample. Multiple comparisons were used to further probe any significant within-group differences. However, all indications were that on the basis of age and IQ, the groups were not significantly different to start with.

The findings that the groups were not statistically different on pre-test measures for each of the dependent instruments used, greatly facilitated the gain score analysis by enabling one to discuss treatment effects with reference to post-test gains. One-way analysis of variance methods (ANOVA 16) were used to test the significance of initial pre-test differences for each measure used.

Correlation analysis, using *Pearson Product Moment Correlations*, was used to investigate the consistency with which the three dependent measures measured spelling performance. The correlation coefficients obtained were all high and significant at the $p < 0.05$ level, indicating stability in spelling measurement. The criterion validity of the *Informal Spelling Inventory* was established against the known validity of the *Stanford Achievement Spelling Test*.

Again, the *Pearson Product Moment Correlation* was significantly high (r = 0.72). Similarly, the *Schonell Graded Word Spelling Test*, when compared to the Stanford, yielded an r of 0.77.

The two-way ANOVAs used in this study provided the backbone of the analysis which focussed on testing the hypotheses stated. These analyses were carried out for each of the dependent variables used separately. Consistently, Factor B, the pre-test/post-test changes, was significant on each of the test scores analyzed. Even for an eight-week treatment, this finding has not been unexpected. However, this situation was of special interest on the Schonell, when multiple comparisons established that the differences between the Control Group and Experimental Group 2 contributed significantly to the significant F found. The predictions in Hypothesis 1 were satisfied by this finding. On the *Informal Inventory*, the post-test score of Experimental Group 2 was superior significantly to that of Experimental Group 1. This could easily be explained with reference to the treatment used, but it was difficult to use the same argument to explain why Experimental Group 1 was inferior to the Control Group on the same measure.

With regards to the efficiency of the multi-channel multi-modality approach, the significant A x B interaction noted on the Schonell analysis was of interest. This is best seen graphically (Figure VII.2). When the three pre-test/post-test magnitudes are compared across groups, the greatest difference is between Experimental Group 2 and the Control Group. This difference reaches significance. The others are non-significant. Hypothesis 1, while not predicting this interaction, is in accord with the treatment superiority of the spelling approach used with Experimental Group 2, which influenced the pre-test/post-test magnitude.

It should be noted, finally, that Hypotheses 3 and 4 did not reach statistical significance but, when examined graphically and descriptively, did show expected trends. Factor A, group superiority, was non-significant for each of the measures used. The fact that the spelling treatment used did not clearly define the groups may well be a function of the study, as indicated in the discussion on limitations.

I. Limitations Of The Investigation

Several limitations were apparent in the investigation. These included limitations in two of the tests used, the length of time for the investigation, implementation of the methodologies, and the size of the sample.

Measurement Limitations

Two of the tests used, the *Stanford Achievement Spelling Test* and the *Informal Inventory*, seem limited in their scope for measuring spelling achievement. The procedures of the Stanford, as administered at the fifth-grade level, set a mandatory ceiling at the beginning of the seventh grade test words. This ceiling prevented the testing of spelling for the fifth-grade students beyond that point. Thus, if spelling ability of the sample subjects was below the seventh grade, the Stanford test could produce an accurate assessment of their achievement. However, if the sample subjects were superior spellers, the mandatory ceiling on the Stanford had a levelling effect on their spelling achievement score since it prevented the good spellers from being tested to their highest level of capability. Thus, the mandatory ceiling tended to lower the mean achievement scores on the Stanford, resulting in an obscuring of any definite superiority that might have been shown by a specific group.

Despite its tested validity against the Stanford (r = 0.72), the *Informal Inventory* was also limited in its measurement potential due to the formula set out by Mann and Suiter (1974) for designing the Inventory. This formula determined the number of words in the inventory by taking the total spelling vocabulary to be taught, 160 words, and dividing it by 20. Every eighth word from the list of 160 words was then chosen for the Informal Inventory. Thus, the formula only allowed a twenty-word inventory. With such a limited inventory, each word had a value of 5% of the total score. On the pre-test, the Control Group had a mean achievement of almost 74%, which meant that they had to increase their post-test score by only five words in order to achieve a perfect score of 100%. Experimental Group 1 had a pre-test mean score of 70%, which only allowed room for possible improvement of six words. Experimental Group 2, with a pre-test mean score of almost 79%, had room for improvement of only four words. Thus, the limited twenty-word vocabulary did not provide enough scope to act as a realistic measure of spelling improvement. From that point of view, therefore, the Schonell test, with its unlimited ceiling, provided the only measure that tested the maximum capabilities of some students.

Time Limitations

A second limitation of the investigation involved the length of time taken for the experiment. It was possible that the effectiveness of three instructional methodologies could not be adequately measured over an eight-week period. It is probable that an investigation over a period of one year may have provided better differentiation of the groups on spelling performance.

Methodological Limitations

A third limitation possibly resulted from the manner in which the methodologies were implemented. The test-study-test method, as implemented, may not have allowed enough time for studying individual word lists. Students only studied their individual word lists for seven minutes per day, for three days each week. It is also possible that the use of the basal speller as the source of instruction for the remainder of the time made the test-study-test and study-test methods too similar to produce more significant discrepant results.

It is also possible that the students following the study-test method may have had the advantage of familiarity with the method from the onset of the investigation. The students of the other two subgroups may have been handicapped by having to adjust to a new procedure for studying spelling.

Sample Limitations

A fourth limitation involves the specific characteristics of the children available for the study. Only limited numbers of fifth-grade children (96) were available for random selection as sample members. Within the sample, initial spelling means indicated that the subgroups contained very few children with severe spelling difficulties. Had the investigation been conducted only with children who had spelling difficulties, the results might have been very different.

Teacher Limitations

It must be realized that the teachers involved in an investigation may inadvertently exchange ideas concerning their respective parts in the study. While the teachers involved in the current investigation were specifically asked to avoid this situation, the possibility of this occurrence must always be considered as a limitation to any methodological investigation utilizing several instructors..

VIII. DISCUSSION AND IMPLICATIONS

A. Introduction

The main purpose of this study was to investigate the relationship of three different spelling methodologies to spelling achievement. This chapter provides a possible rationale for the general findings as related to each of the three specific instructional approaches used. Theoretical research and practical implications of the study are also discussed.

B. Effective Spelling Methodologies

The central hypothesis of the study was that the multi-channel, multi-modality spelling instructional approach would result in significantly greater achievement gains than either the traditional study-test or the test-study-test approach. This was partially substantiated with regards to Hypotheses 1 and 2. A possible reason why the multi-channel multi-modality approach was shown to achieve greater spelling gains may be due to the fact that multi-channel instruction combined linguistics, visual and auditory skill development with multi-modality input. Thus, in addition to furthering intersensory transfer, the method allowed the subjects to receive critical spelling skills through their strongest modalities. One further advantage of the method was that motivation and attention to task were kept at an optimum level by having the subjects actively involved in their learning. One aspect of this active involvement included a VAKT approach to spelling input. Another aspect involved the provision of definitions of list words and sentence context examples by students. This technique of furthering linguistic knowledge provided deeper understanding of the meanings of the list words and their derivations, as the students had to actively interpret the definitions according to their own experiences and determine the syntactical effect of the use of a derivative form of a list word on sentence structure before oral or written sentence context could be constructed. Students were also required to be active learners in the spelling process by the necessity for a search of their own learned phonological and generalization knowledge in employing a generate-and-test approach when written spelling vocabulary was needed. Student involvement was also furthered by a judgement requirement on the part of each student in determining when proofreading of his or her written sentence context was complete for marking purposes. The graphing of pre-test and post-test results also aided motivation. Instant correction of misspelling with underlining of the difficult part provided feedback for the student on his word knowledge. These factors that encouraged active learning on the part of the students through the multi-channel multi-modality approach were absent in the study-test instruction.

In comparing the multi-channel multi-modality approach with the study-test method, the students of the traditional study-test group were passive learners, mainly dependent on the basal spelling text for skill instruction. If a student was unable to understand the instructions or the content of the lessons provided by the text, then the effect of the lesson on spelling achievement would be minimal. Motivation of a passive learner is also much more difficult to establish and maintain (see Table VIII.1).

In a comparison of the multi-channel multi-modality method with the test-study-test approach, the latter method did not provide any direct instruction relative to the spelling vocabulary on linguistic, visual or auditory skills. While study time for individual word lists was a part of this method, over-learning of list words by use of the VAKT approach and sentence context as included in the multi-channel multi-modality approach was absent. The lack of direct instruction thus seriously affects the learning of a student who lacks critical spelling skills, poor attention span, or a personal method of study. The test-study-test approach also failed to provide a means of transfer of spelling skills to unfamiliar words, as had been incorporated in the best-guess or generate-and-test procedures in the multi-channel multi-modality instruction.

Hypotheses 3 and 4, which dealt with the superiority of the test-study-test instruction over the study-test method, were not confirmed. While these findings are contrary to the

TABLE VIII.1
A COMPARISON OF THE CRITERIA OF THE THREE METHODOLOGIES

CRITERIA	METHODOLOGY		
Multi-Channel	Study-Test	Test-Study-Test	Multi-Modality
1. Student is a passive learner	X		
2. Student is an active learner		X	
3. Student is mainly dependent on visual input	X	X	
4. Student receives multi-modality input (VAKT)			X
5. Low motivation	X		
6. Good motivation		X	X
7. Direct instruction on visual, auditory and linguistic skills			X
8. Indirect linguistic instruction	X		
9. Employs generate-and-test procedures			X
10. Uses sentence context			X
11. Provision for over-learning			X
12. Direct instruction on utilization of proofreading skills			X
13. Direct instruction on word-study approach			X
14. Use of self-corrected pre-test and graphing of results		X	X

presently accepted viewpoint on the instructional efficiency of the study-test *versus* the test-study-test methodology, they are not contrary to some of the earlier and modern research findings.

Beatty (1955), in comparing the efficiency of the study-test and the test-study-test methodologies on spelling achievement,conducted five experiments with these methodologies in grades 4 to 6, involving eighty-seven classes. Beatty concluded that the study-test method produced significantly greater achievement in three of the experiments at the fourth and fifth grade levels, while no significant difference existed in the other experiments between spelling achievement produced by the two methodologies.

Pavlak (1956), in a study of the scientific research in spelling, analyzed the research on the study-test and the test-study-test methodologies. Pavlak noted that success of the test-study-test method was dependent on good study plans by the students. Pavlak also observed that the retention of spelling vocabulary through use of the two methodologies was about the same. Furthermore, Pavlak maintained that studies indicated that errors made by students following the test-study-test method tended to persist as wrong impressions. Pavlak concluded, from his investigation of accepted studies, that neither the test-study-test nor the study-test approach was superior in the achievement of spelling competence.

Dunkeld and Hatch (1975) noted that Horn's finding on the test-study approach have also been interpreted as meaning that it makes little difference whether the words were tested first or studied, then tested for those students who possess extensive vocabularies do well on the traditional study-test approach, while careless spellers improve through the test-study method. It was reasoned that the test-study approach draws the poor speller's attention to his errors.

Lerner (1981), in contrast to Dunkeld and Hatch, observed that the test-study method was more effective with older children who already possessed a fairly good spelling vocabulary. She observed that only older students did not need to study all the word lists, as many of the words were already in their written vocabularies. Younger students and poor spellers were seen as achieving greater spelling success with the study-test approach. In the present study, the students may not have been old enough to possess adequate spelling vocabularies or may have lacked adequate personal study skills to learn most efficiently by the test-study-test method. If personal word-attack skills were lacking in some early fifth-grade children, then the students following the study-test approach with its stuctured basal lessons would probably achieve almost equally with the test-study-test group.

Thus, in comparison with the above studies, the findings of this investigation, in regards to a lack of significant difference in the study-test *versus* the test-study-test methodology for producing spelling achievement, are not unique results. The research indicated that the presence of inadequate critical spelling skills, poor personal study methods and short attention span in students could result in lowered spelling performance when learning by the test-study-test method. A period of instruction, longer than the eight weeks of this study may have thrown more light on the efficacy of the method used.

C. Theoretical And Research Implications

From the viewpoint of the Personke-Yee theory, the previous positions on spelling acquisition each represented only one aspect or choice in the possibilities for spelling behavior. No theory was wrong, but only incomplete. Thus, the Personke-Yee theory, with the addition of the situational choice, acted as a unification of the fragmented or partial philosophies and theories of spelling behavior. Therefore, the eventual effect could be to eliminate the controversy surrounding the attainment of spelling due to the concept that each of the previous spelling theories represented a part of the spelling act. There is need for more research to test the Personke-Yee theory, although this study resulted in partial confirmation of the theory.

Implications for future research were also apparent from the results of this study. As the multi-channel multi-modality input represents the only aspect of the

Personke-Yee theory that has been researched with some degree of thoroughness, much work remains to be done on the specific components of the theory. These components include the effect on spelling achievement by utilization of the best-guess approach to word production and dictionary instruction to aid the best-guess approach. There is need for research on the effects of instruction in the use of alternate graphemic choices to represent phonemes, and the value of proofreading techniques. Even though the effect of proofreading practice and the best guess approach to word production was initially investigated by Personke and Knight (1967), and reinforced in the writings of Simon and Simon (1973), Peters (1975), Markoff (1976), Cramer (1976), Marino (1981) and Weis and Weis (1982), little additional investigation has since occurred on these components of the theory.

In addition to investigation on the specific components of the Personke-Yee theory, the resulting methodology needs to be tested on varied student populations, for extended periods of time of at least one year in duration. The current investigation involved only limited numbers of students of average ability from a fifth grade level. Future investigations need to include other grade levels, larger student populations, more variance in the abilities of the students and in the types of classroom settings. Those studies should involve the study of spelling achievement through the multi-channel multi-modality methodology with students who are below average in intellectual functioning, as well as with students who possess normal intellectual ability but who have severe spelling deficits. The effectiveness of the multi-channel multi-modality methodology should also be tested in resource room settings, special education rooms, as well as further testing in heterogeneous classrooms.

Even though the Personke-Yee theory and the multi-channel multi-modality methodology still require much more research, the indications of the superiority of this methodology in the current investigation hold some implications for classroom instruction in spelling.

D. Practical Implications

The current investigation provided further evidence that the implantation of spelling information within the memory storage is best accomplished by utilization of a multi-channel multi-modality approach, in combination with the appropriate linguistic analysis of the word. In this investigation, the multi-modality input involved the sound and letter sequencing of the words by the VAKT approach, utilizing both oral and written forms. The linguistic information included the phonological, morphological and generalization aspects of the word, wherever applicable. The morphological information accompanied the development of word meanings. The utilization of multi-modality input combined with linguistic knowledge appears to further both the initial learning and transfer of the word and its derivative forms to written composition and to aid in the spelling of new words. This concept is supported by the findings of Hodges (1965), Brothers and Holsclaw (1969), Simon and Simon (1973), Markoff (1976), Wallace and Larsen (1979) and Henderson and Beers (1980). With regards to the production of needed spelling vocabulary, this study provided further evidence for the use of the generate-and-test procedures. To develop skill in the use of this procedure, direct instruction in the alternate graphemic choices that could represent a particular phoneme should be provided.

Utilization of the best-guess approach should also involve much practice with the spelling vocabulary and its derivations in both oral and written form. The necessity of this extensive practice was reinforced by the work of Cramer (1977), Hillerich (1977), Mann, Suiter and McClung (1979), Nicholson (1979) and Johnson, Langford and Quorn (1981).

In the current investigation, the students following the multi-channel multi-modality instruction were encouraged to check their written work using proofreading skills and/or a resource source. Proofreading of the work for errors was followed by correction of misspellings. Peters (1975), Wallace and Larsen (1979) and Weis and Weis (1982) noted the necessity for proofreading skills in spelling, the difficulty in establishing the habit of self-correction and the necessity of ensuring the retention of only the correct image of the word in memory storage.

Not all of the skills of the multi-channel multi-modality spelling methodology are appropriate for introduction in the lower elementary grades. Introduction of phonological and generalization knowledge for spelling purposes should follow the development of spelling skills as indicated by Beers and Henderson (1980). Using these guidelines, the spelling instruction in lower elementary grades should be based on a language-experience approach. Students can be encouraged to employ the best-guess method for needed spelling vocabulary in written compostion, but only to the extent of spelling requirements that involve phonetically regular spellings, along with some regular long vowel combinations. Basically, the teacher will need to provide irregularly spelled words or portions of words.

The upper elementary grades should involve complete use of the multi-channel multi-modality approach to spelling, wherever possible. The requirement for proofreading of written work should begin at least by the fifth grade, and direct instruction should be given to develop visual memory and association of irregular vowel cluster group sounds.

To produce effective learning situations requires high motivation of the students by the teacher. In this investigation, motivation in the multi-channel multi-modality instruction was furthered by having different students fill the role of instructor when a word was to be learned by the VAKT approach. This motivated the student to actively analyze the word that he was to teach, to determine his instructional approach. When the teacher acted as the instructor, the students always decided the method of attack to be used in learning the word and gave reasons for their choice.

Procedures for implementing the VAKT approach were also varied. Tracing of the word involved the choices of use of a desk model, tracing in the air or on the arm or back of another student. If a word is phonetically regular and well known, the structured steps of the VAKT procedures could be shortened to a single simultaneous sound and write procedure, or omitted entirely.

Derivative forms of the list words were always included in the final test. When some of the derivative forms involved a much higher level of spelling competence than the fifth grade, the poor spellers were given the choice of whether or not they wished to write these words and whether the marking of these difficult words was to be included in their final results. With these choices, the students with deficient spelling skills were excited and motivated to try to learn the difficult derivations of the list words.

The Personke-Yee model can also serve as a qualitative measure of the student's progress. As the teacher interacts with the student in the generate-and-test procedure, the teacher is able to see if the student is experiencing difficulties in utilizing any particular skills, such as regular sound-symbol relationships, rules of generalization, ability to use prefixes and suffixes, weaknesses in visual sequential memory for the letter sequence of irregular cluster sounds. If difficulties are present, then the teacher and student can immediately review these skills, relative to the needed word, which should enhance the speller's motivation and attitude for learning skills and the spelling of the word.

In conclusion, the Personke-Yee theory has served to clarify the totality of spelling behavior, and indicate how the various spelling philosophies and specific skills and behaviors fit into the compelte act. As the multi-channel multi-modality instruction is based on this theory, general classroom use of this instructional approach could improve spelling competence in students, and provide classroom teachers with a framework for spelling instruction which goes well beyond the traditional basal spelling approach with its emphasis on memorization.

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APPENDIX A

Informal Inventory A Of Spelling Units One To Eight

APPENDIX A: Informal Inventory A Of Spelling Units One To Eight

1. tired	The boy is very tired.
2. shipping	The man is shipping his parcel by airmail.
3. feather	The chicken lost a feather.
4. guessed	The man guessed at the answer.
5. post office	Get your mail through the post office.
6. return	The girl will return the pencil to the teacher.
7. anger	The man felt a great deal of anger.
8. harvest	It is soon time to harvest the crops.
9. mean	The dog was mean to the cat.
10. act	The first act of the play was over.
11. perhaps	The child knew that perhaps he would be late.
12. stretch	The rope will stretch across the room.
13. explore	The child will explore the woods.
14. beast	The beast was very large and fierce.
15. due	The rent is due at the end of the month.
16. hire	The farmer will hire the boy to drive the tractor.
17. hunt	The woman must hunt for the lost keys.

18. answered	The student answered the question quickly.
19. steer	The steer broke through the fence.
20. question	The student asked a good question.

APPENDIX B

Informal Inventory B Of Spelling Units One Through Eight

APPENDIX B: Informal Inventory B Of Spelling Units One Through Eight

1. tribe	The tribe of Indians lived by the river.
2. everybody	The games were enjoyed by everybody.
3. weigh	The farmer will weigh the pig.
4. chalk	The chalk was white in color.
5. lonesome	The dog was lonesome for its master.
6. worth	The toy was of great worth to the child.
7. signal	The turn signal on the car was not working.
8. deal	The man will deal the cards.
9. slippery	The road is slippery when it is wet.
10. matter	The matter of the spelling marks was discussed by the teacher
11. western	The boy likes to read western novels.
12. bowl	The bowl of sugar sat on the table.
13. twenty-five	There were twenty-five students in the class.
14. rubber	The tire was made of rubber.
15. power	The car had lots of power.
16. stormy	The day was very cold and stormy.
17. kilogram	The sugar weighed one kilogram.

18. growth	The growth of the child was very fast.
19. perfect	The student got a perfect score on the test.
20. final	It was the final day of the holidays.

APPENDIX C

Schonell Graded Word Spelling Test A

THE SCHONELL GRADED WORD SPELLING TEST A

net	can	fun	top	rag
sat	hit	lid	cap	had
let	doll	bell	yes	then
may	tree	by	ill	egg
land	how	your	cold	talk
flower	son	seem	four	loud
ground	lowest	folk	write	amount
noise	remain	hoped	worry	dancing
damage	else	through	entered	cough
fitted	spare	daughter	edge	search
concert	domestic	topic	method	freeze
avoid	duties	recent	type	instance
liquid	assist	readily	guess	attendance
description	welfare	various	genuine	interfere
accordance	mechanical	anxious	signature	allotment
approval	accomplished	remittance	financial	capacity
surplus	exceptionally	successful	preliminary	resource
prologue	colonel	coarse	referring	courteous
exhibition	affectionately	attorney	pinnacle	toboggan
define	guarantee	anniversary	paraffin	accomodate

APPENDIX D

Schonell Graded Word Spelling Test B

THE SCHONELL GRADED WORD SPELLING TEST B

see	cut	mat	in	ran
bag	ten	hat	dad	bed
leg	dot	pen	yet	hay
good	till	be	with	from
time	call	help	week	pie
boat	mine	sooner	year	dream
sight	mouth	large	might	brought
mistake	pair	while	skate	stayed
yoke	island	nerve	join	fare
iron	health	direct	calm	headache
final	circus	increase	slippery	lodge
style	bargain	copies	guest	policy
view	library	cushion	safety	patient
account	earliest	institution	similar	generous
orchestra	equally	individual	merely	enthusiastic
appreciate	familiar	source	immediate	breathe
permanent	sufficient	broach	customary	especially
materially	cemetery	leisure	accredited	fraternity
subterranean	apparatus	portmanteau	politician	miscellaneous
mortgage	equipped	exaggerate	amateur	committee

APPENDIX E

Stanford Achievement Test: Spelling Lists: Forms E And H

APPENDIX E: Stanford Achievement Test: Spelling Lists: Forms E and H

Spelling List: Form E

Fourth grade pupils are given words from number eleven to number sixty, *fifth grade pupils from number twenty-one to number seventy*, and sixth grade pupils from number thirty-one to eighty. Read the number of each word and caution pupils to write the word on the line that has the number of that word. According to the directions in the manual, *the word is pronounced, the sentence is read, and the word is repeated*.

Fourth grade starts here. (Call these words 'numbers 1 to 50' instead of '11 to 60'.)

11. wind	Several big trees were blown down by the wind.
12. hay	Our pony eats grass and hay.
13. card	I received my report card today.
14. black	Coal is black.
15. band	The band played the "Star Spangled Banner".
16. them	Your books are new. Take good care of them.
17. fell	Mary was hurt when she fell off the horse.
18. noon	We call our noon meal lunch.
19. bear	We saw a large white bear at the zoo.
20. snowing	The ground is white when it is snowing.

**Fifth grade starts here. (Call these words numbers 1 to 50 instead of 21 to 70.)*

1. mine	Your shoes are black; mine are brown.

2. show	It cost five pins to see our pet show.
3. trouble	Tom's thoughtlessness gets him into trouble.
4. forget	Did you forget to wear your rubbers?
5. tie	Can you tie a bow knot?
6. paper	Write your lesson on ruled paper.
7. nap	He was still sleepy after his nap.
8. start	Unless you start now, you will be late.
9. never	George has never been absent or tardy.
10. why	I wonder why Helen looks so sad.

Sixth grade starts here. (Call these words numbers 1 to 50 instead of 31 to 80.

11. glass	Please give me a glass of water.
12. pass	Never pass a car on a curve.
13. bit	May I have a bit of candy?
14. dresser	A dresser is a kind of furniture.
15. began	She fell down and began to cry.
16. use	We will use pins for money and play store.
17. tire	One front tire of our car is flat.
18. lesson	Today's lesson was about the Eskimos.

19. load	Henry hauled a load of dirt in his wagon.
20. easy	Do the easy problems first; then the hard ones.

Seventh grade starts here. (Call these words numbers 1 to 50 instead of 41 to 90.

21. knew	Jane knew every word in her lesson.
22. plum	A prune is a kind of plum.
23. cared	I wish you cared more about music.
24. wear	You should not wear rubbers in the house.
25. bigger	A horse is bigger than a pony.
26. fullest	The fullest bucket is already running over.
27. struck	He was struck by a car and hurt badly.
28. captain	The captain ordered the ship to sail.
29. loose	I tied the horse to a tree but he got loose.
30. written	I have just written a letter to my cousin.

Eighth and ninth grades start here. (Call these words numbers 1 to 50 instead of 51 to 100).

31. beauty	Most persons enjoy the beauty of sunsets.
32. either	Tom wants either a wagon or a scooter.
33. promised	Mother has promised me a birthday party.

34. fern	A fern is a plant with a feather-like leaf.
35. advertise	Did you advertise you lost dog in the paper? (Credit advertize.)
36. instruct	Please instruct us where to go.
37. support	She had to lean on my arm for support.
38. neither	He worked two days with neither food nor rest.
39. really	Is it really true that you are going?
40. shipped	We shipped two carloads of freight.

Fourth grade stops here.

41. possible	There are two possible answers to the question.
42. prefer	Which color do you prefer, green or brown?
43. favorite	Blue is my favorite color.
44. exactly	The time is exactly midnight.
45. occupied	Every seat was occupied and many were standing.
46. receive	Did you receive my letter?
47. territory	Much of this territory is swamp land.
48. disagreeable	Mary's complaining makes her a disagreeable child.
49. estimated	They estimated the crowd at five hundred.
50. sense	This story doesn't make sense to me.

Fifth grade stops here.

71. semester	A semester is half of a school year.
72. prosperous	A successful businessman is prosperous.
73. orchestra	The orchestra gave a pleasing concert.
74. choir	The choir sang the hymn beautifully.
75. blizzard	The gentle snow turned into a raging blizzard.
76. engineering	Dams and bridges are engineering accomplishments.
77. official	A governor is a state official.
78. community	Our community has a thousand people.
79. appreciating	He is not appreciating the value of music.
80. sincerely	Mary ended her letter with "yours sincerely.

Sixth grade stops here.

Spelling List: Form H

Fourth-grade pupils are given words from number eleven to number sixty, fifth-grade pupils from number twenty-one to seventy, and sixth-grade pupils from number thirty-one to eighty. The words are to be read as though they were numbered one to fifty. Read the number of each word and caution pupils to write the word on the line that has the number of that word.

Fourth grade starts here. (Call these words numbers 1 to 50 instead of 11 to 60.)

11. tell	Never tell a secret.
12. belong	Does this kitten belong to you?
13. game	We played a game called "pull-away".
14. two	The next number after one is two.
15. deep	The water in the ocean is very deep.
16. town	A city is larger than a town.
17. upon	Once upon a time there were no railroads.
18. hard	Wood is not so hard as iron.
19. faster	Airplanes go faster than trains.
20. place	I lost my place in the book.

*_Fifth grade starts here. (Call these words numbers 1 to 50 instead of 21 to 70.)_

1. standing	Is the horse lying down or standing up?
2. add	To find the sum of two numbers we add.
3. kind	Children should be kind to their pets.

4. river	We crossed the river in a boat.
5. our	Please come over and play at our house.
6. spring	The door is held shut by a spring.
7. city	This town is almost as large as a city.
8. cool	A little ice will cool the water.
9. care	You should take good care of your pets.
10. were	They were here, but they are gone now.

Sixth grade starts here. (Call these words numbers 1 to 50 instead of 31 to 80.)

11. wide	This room is fifteen feet long and ten feet wide.
12. finger	Put the ring on my little finger.
13. leg	The knee is part of the leg.
14. riding	Horseback riding is excellent exercise.
15. kisses	There were many kisses as they said good-bye.
16. early	Seven o'clock is early in the morning.
17. paint	Do you like to paint with water colors?
18. iron	Stoves are made of iron.
19. washed	Mother washed the clothes on Monday.
20. catch	Can you catch the ball with one hand?

Seventh grade starts here. (Call these words numbers 1 to 50 instead of 41 to 90.)

21. nearer	The moon is nearer to us than the sun.
22. says	The sign says, "Slow, dangerous!"
23. learned	Have you learned to skate on ice yet?
24. stayed	We stayed in a hotel for three days.
25. lately	Where have you been lately?
26. animal	What animal do you like the best for a pet?
27. taste	I do not like the taste of olives.
28. potatoes	I like mashed potatoes and gravy.
29. garage	We keep our car in a neighbor's garage.
30. quiet	It was so quiet you could hear a pin drop.

Eighth and ninth grades start here. (Call these words numbers 1 to 50 instead of 51 to 100.)

31. valley	The river valley lies between two hills.
32. settled	The rain cooled the air and settled the dust.
33. butcher	How much does the butcher charge for beef?
34. remembering	Are you remembering my birthday?
35. result	The broken arm was a result of her fall.

36. arrived	The train arrived at the station at 7:30.
37. telegram	Sending a telegram is usually quicker than writing a letter.
38. library	Our library has more than a thousand books.
39. humor	I see no humor in that joke.
40. cashier	A cashier handles money in a bank.

Fourth grade stops here.

41. course	The ship changes its course from north to east.
42. accept	I shall accept your invitation with pleasure.
43. encourage	Praise will often encourage a pupil.
44. desiring	Those desiring to go may leave now.
45. source	Clouds are the source of rain.
46. type	John is not the type of boy to steal.
47. planning	We are planning a school party for Halloween.
48. practicing	Helen is practicing on the piano.
49. talent	His paintings show unusual talent.
50. appearance	His sudden appearance frightened me.

Fifth grade stops here.

71. label	The label on the can says "String Beans."
72. succeeded	After three failures, Bobby succeeded.
73. acknowledge	This note will acknowledge your letter.
74. favorably	His request was acted upon favorably.
75. gradually	Ice gradually changes into water.
76. exhibit	We saw an exhibit of animal pictures.
77. physical	The doctor gave me a physical examination.
78. necessary	Food, air, and water are necessaryto keep us alive.
79. specially	An acrobat is specially strong.
80. preliminary	A short talk was preliminary to the main address.

Sixth grade stops here.

APPENDIX F

Specific Instructional Procedures

APPENDIX F: Specific Instructional Procedures

Control (Traditional) Lesson Procedure

The traditional instructional procedures were developed around the following outline. Each spelling lesson was equivalent to twenty-five minutes per day, for four instructional days and one testing day per week.

Spelling Lesson One - Unit One

1. Overview of word list by the teacher
    a. pronunciation of words by teacher and students.
    b. discussion of unfamiliar words
2. Assignment - basal text
    a. Exercise A - written

Spelling Lesson Two - Unit One

1. Discussion and correction of Exercise A.
2. Assignment - basal text
    a. Exercise B - written

Spelling Lesson Three - Unit One

1. Assignment
    a. practice test - correction of test by students
    b. completion of Exercise B - written
2. Discussion and correction of Excercise A. Correction of their own errors by students

Spelling Lesson Four - Unit One

1. Assignment - basal text
    a. Exercise C - oral or written
2. Discussion and correction of Exercises B and C
3. Correction of errors in Exercises B and C

Spelling Lesson Five - Unit One

1. Mastery test
    a. utilized the spelling of dictated sentences
    b. marked by the teacher
    c. results graphed by the students

Units Two Through Eight

1. Format of Unit One utilized for Units Two through Eight

Experimental Group 1:

(Test-Study-Test) Lesson Procedure

The test-study-test instructional procedures were developed around the following outline. Each spelling lesson was equivalent to twenty-five minutes per day, for four instructional days and one testing day per week.

Spelling Lesson One - Unit One

1. Overview of word list
    a. pronunciation of words by teacher and students
    b. discussion of unfamiliar words
2. Pretest of Unit One words. Correction by students of their own papers.
3. Individual study lists prepared by students based on their own pre-test errors
4. Pre-test errors studied by students.
5. Assignment - basal text
    a. Exercise A - written

Spelling Lesson Two - Unit One

1. Discussion and correction of Exercises A. Correction of Exercise A errors by students
2. Individual study by students of their own study lists.
3. Assignment - basal text
    a. began Exercise B - written

Spelling Lesson Three - Unit One

1. Completion of Exercise B - written
2. Discussion and correction of Exercise B. Correction of Exercise B errors by students

Spelling Lesson Four - Unit One

1. Assignment - basal text
    a. Exercise C - oral or written
2. Correction and discussion of Exercise C. In written part of the exercise, correction of Exercise C errors by students
3. Individual study by students of their own study list.

Spelling Lesson Five - Unit One

1. Mastery Test
    a. marked by teacher
    b. results graphed by the students

Units Two Through Eight

1. Format of Unit One utilized for Units Two through Eight

Experimental Group 2:

(Multi-Channel Lesson Procedure

The multi-channel instructional procedures were developed around the following outline. Each spelling lesson was equivalent to twenty-five minutes per day, for four instuctional days and one testing day per week.

Spelling Lesson One - Unit One

1. Introduction
    a. explanation by the teacher that Unit One from the spelling text would be taught that week, using a procedure that differed in parts from that of the regular spelling approach
2. Pretest of Unit One words
    a. marked by the students
    b. results graphed by the students
3. Errors for individual students to be rewritten in correct form once. Composition of study list by individual students, based on their own errors
4. Distribution of tracing styli and individual desk models of Unit One spelling words and their derivative forms
5. Pronunciation of the first word from Unit One spelling list by teacher, then students, with students looking at the word model during word pronunciation
6. Development of word meaning by teacher
    a. used the word in oral sentence context
    b. developed root word meaning
    c. explained the effect of prefixes, suffixes and affixes present on root word meaning
7. Provision of three to four examples of the word used in oral sentence context by students

8. Pronunciation of the letters in unison by students and teacher while the written letters on the model were simultaneously traced by the students and the letters were written on the board by the teacher
9. Discussion of the word by the teacher
    a. spelling generalization
    b. spelling irregularities
10. Pronunciation of the word in syllables in unison by teacher and students while the written syllabic sequence was simultaneously traced by the students on the desk model and the word was written in syllables on the board by the teacher
11. Study of first five basic spelling list words from Unit One and their derivatives in the above manner
12. Assignment
    a. use of all words studied in written sentence context by the students and marked by the teacher Correct grammatical structure, punctuation and spelling were required
    b. restudy by students (using desk model) of any personal study list words and their derivative forms introduced during the period

Spelling Lesson Two - Unit One

1. Study of next five basic spelling list words and their derivative forms by use of the procedures of Lesson One, Steps 3 through 12
2. Any words causing difficulty for students from Lesson

One were reworked by the students individually on the desk models

3. Correction of Lesson One context sentence errors by students

Spelling Lesson Three - Unit One

4. Study of next five basic spelling list words and their derivative forms according to the procedures of Lesson One, Steps 3 through 12
5. Any words causing difficulty for students from Lessons One and Two were reworked individually on the desk models
6. Correction of Lesson Three context sentence errors by students

Spelling Lesson Four - Unit One

1. Study of next five basic spelling list words and their derivative forms according to the procedures of Lesson One, Steps 3 through 12
2. Any words causing difficulty for students from Lessons One and Two were reworked individually on the desk models
3. Correction of Lesson Three context sentence errors by students

Spelling Lesson Five - Unit One

1. Mastery text of all Unit One list words and a sample of their derivative forms. As weekly test results were not utilized in this study, the sampling choices were left to the teacher

    a. marked by students, using the desk models as a guide
    b. exchange of marked tests to check on the accuracy of marking
    c. results graphed by students

2. Errors for individual students to be rewritten in correct form once
3. Preparation of review lists, by each student, based on his mastery test errors
4. Correction of Lesson Four sentence context errors by students

Units Two Through Eight

1. Format of Unit One utilized for Units Two through Eight

APPENDIX G

Definition of Terms

APPENDIX G: Definition Of Terms

Alphabetic Principle. The principle of using graphemes to signify phonemes which underlies many forms of languages. Ideally, each phoneme would be represented by its own distinctive grapheme. In American-English, the alphabetic principle, in regards to the direct sound-symbol or phoneme-grapheme correspondence, is only partially applicable.

Aural-Oral. Pertaining to hearing and speaking of phonemes. In spelling methodology, learning by the aural-oral approach involves speaking and hearing the letters, sounds, syllables or the whole needed word.

Auditory Discrimination. The ability to discriminate between sounds of different frequency, intensity and pressure pattern components; ability to distinguish one speech sound from another.

Auditory Memory. The ability to remember individual sounds or syllables heard auditorially. When referring to spelling, the sounds or syllables must be remembered in their sequence of presentation.

Base Word (Root Word). That element of a word which remains after all prefixes, suffixes or inflectional endings have been removed.

Derivative Forms. The formation of new words by the addition of affixes (prefixes and suffixes) to base or root words. The original meaning of the root word is altered with the addition of the affixes.

Generate-and-Test Procedure. The production of a needed word, by a speller, wherein a logical guess of the spelling of the word is made, based on the available information concerning possible alternative spellings for necessary sounds. The resultant spelling is checked against a reference source. This procedure is also known as the *best-guess*, or *check-guess* approach for word production.

Grapheme. A unit of writing which in alphabetic systems represents a spoken sound. The phoneme */oi/*, for example, can be represented by the letters *oi* or *oy*; the phoneme */f/* can be represented by the letters *f*, *gh*, or *ff*.

Haptic. Pertaining to the sense of touch in its broadest sense. In spelling instruction, haptic refers to learning by use of the fingers in tracing letters of a word.

Linguistics. The scientific study of the nature and use of language, involving the components of phonology, morphology, semantics and syntax.

Modality. The avenue of perception used--visual, auditory, tactile or kinesthetic--in achieving language skills.

Morphemes. A basic indivisible language unit which carries meaning in a language; the smallest, meaningful unit of language.

Morphology The study of the arrangement and the interrelationship of morphemes in words; the *word building* properties of a language.

Phonemes. The smallest meaningful unit of sound whereby the substitution of one for another changes the meaning of the morpheme (example: bat - pat).

Phonemics. The study, analysis and classification of phonemes; a special study in phonology; a branch of linguistics.

Phonetics. The study of the production, transmission and reception of human speech sounds.

Phonology. The study of a sound structure of a language including the phonetics and phonemics; a branch of linguistics.

Proofreading. The examination of written composition for errors. With regards to spelling, the written composition is scrutinized for misspellings.

Sequential Memory. The ability to remember items in the order that they were presented auditorially or visually.

Syntax. Refers to the way in which the speaker puts words and phrases together to form sentences. Syntax also refers to the branch of linguistics dealing with such relationships.

Study-Test Method. A procedure that requires the study of the total spelling word list through the use of the assigned spelling text lessons from the basal speller and other activities. The total word list is tested once in midweek and for mastery at the end of the spelling unit's activities.

Test-Study-Test Method. A procedure requiring a pre-test of the spelling word list to determine current knowledge of the list for each student before the study of the unit's spelling activities is initiated. Pre-test errors form the basis of the individual study lists for students. The students study their individual lists only, eliminating unnecessary instruction on words that can already be spelled correctly.

Visual Discrimination. The process of distinguishing one object or letter from another visually.

Visual Memory. The ability to remember objects or letters seen visually. When referring to spelling, the letters must be remembered in their sequence of presentation.

Word Variant (Derivative Form). An inflectional form of a word which indicates change in meaning; a variant from the root form of a word, usually created by the addition of affixes to the root word.